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OCTOBER 1952

BUSINESS · ENGINEERING · INDUSTRY

Worthington's Hobart Ramsey: "More than pumps" — p 61

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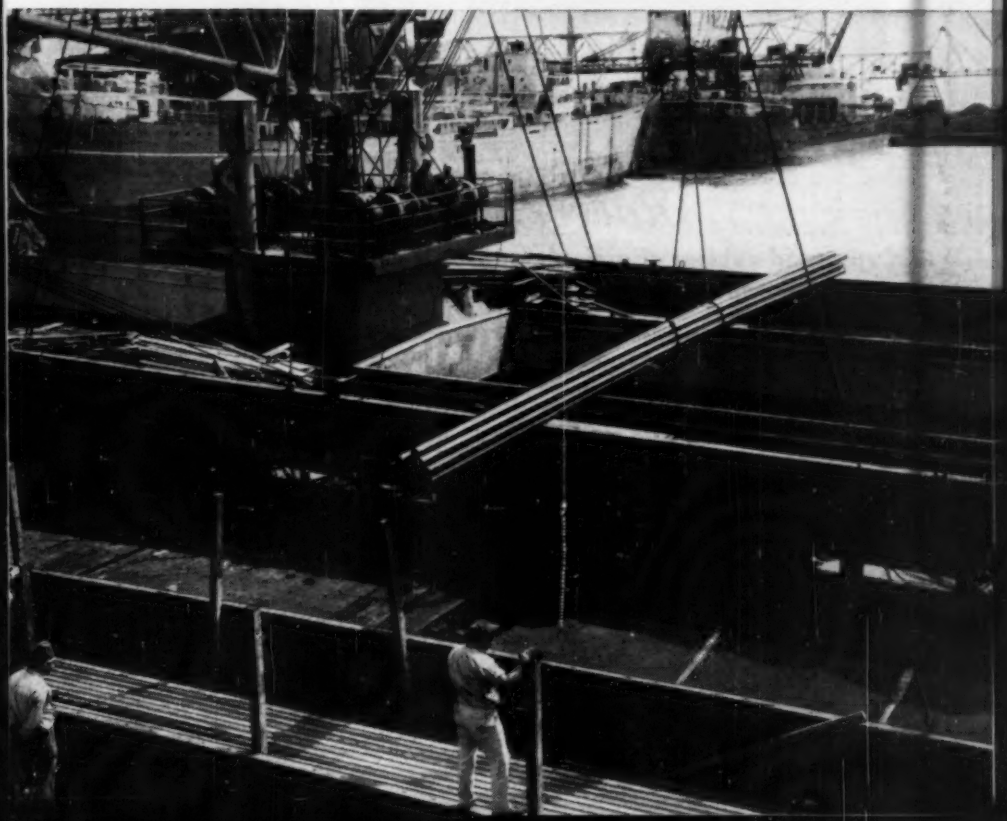

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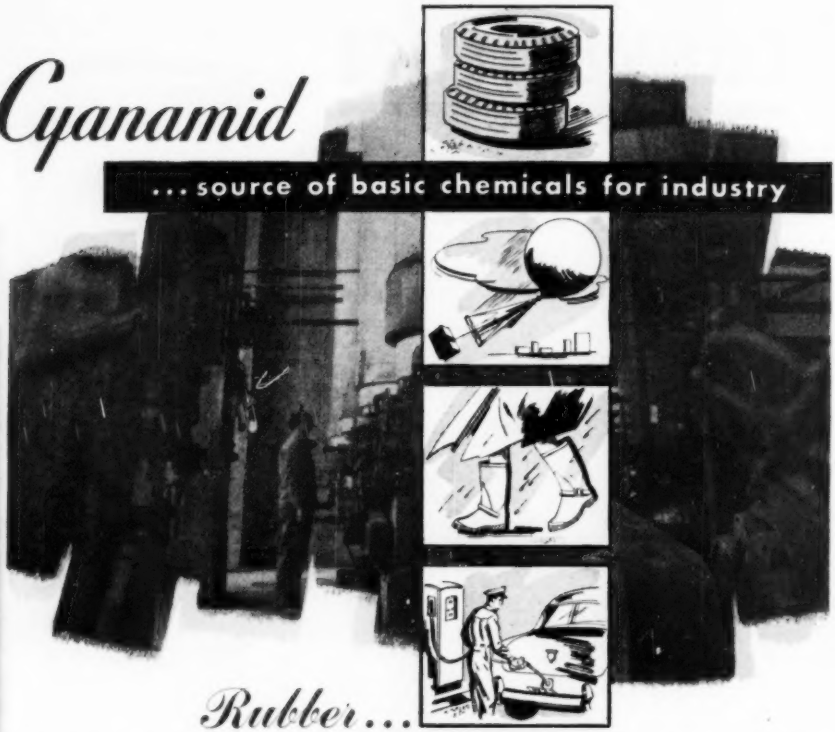

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VOLUME 7
NUMBER 10

Member—Audit
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*Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill Publishing Co. Ltd., McGraw-Hill house, 95 Farringdon St., London, E. C. 4 (British only).* Subscription rates; $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U.S. currency). Entered as second-class matter December 17, 1947, at the post office at New York, N. Y., under the Act of March 3, 1879.

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Water line for hydroelectric plant at Largentière — France Photo—H. Lacheroy

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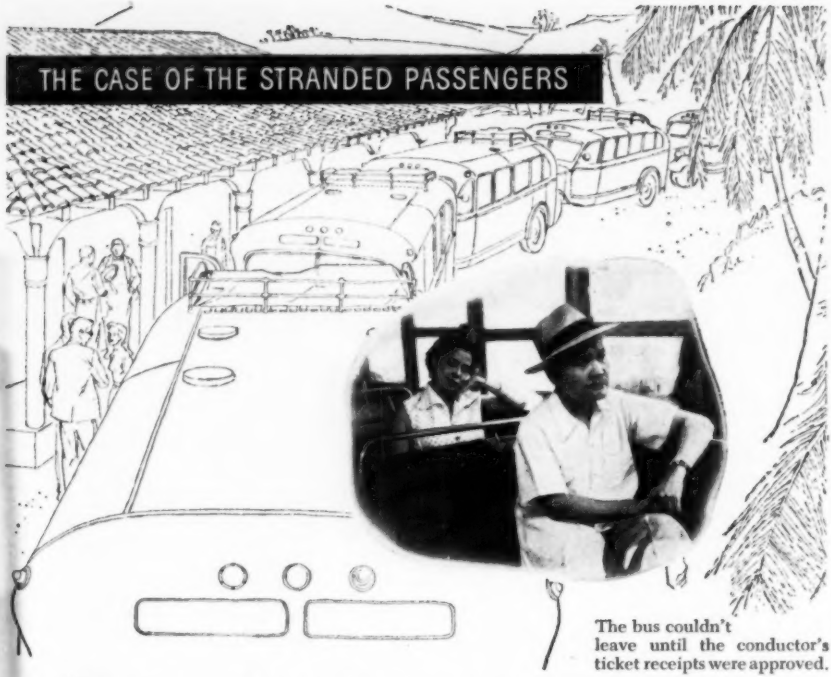


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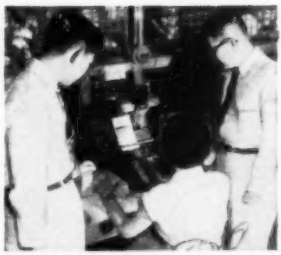

Mr. Mariano G. Enriquez examines one of his new Burroughs machines. On the left is Cesario Uy, the Burroughs man who helped solve the Case of the Stranded Passengers.

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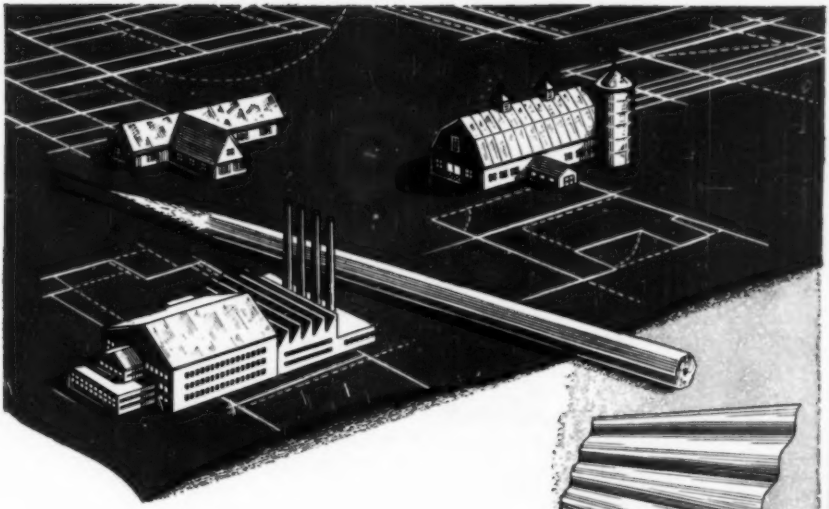

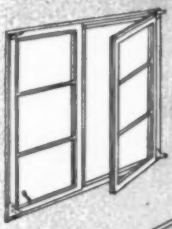

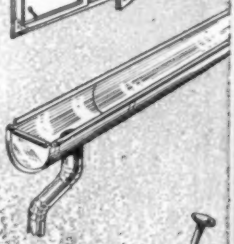

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# BUSINESS TRENDS

**U. S. BUSINESS OUTLOOK**—both long and short range—is basically bright. Consumers are buying almost as much in physical volume as they did during the buying rush of 1951. Business investment is moving to a peak. Home building is in its second best year. Defense spending is still rising.

**Prices paid by consumers** are likely to be steady for the next 12 months. Any rise in the cost of living will be slight, held down in part by big U. S. crops this year.

**Retail food prices** will rise no more than 2% between mid-1952 and mid-1953. Wholesale price index probably will not swing sharply in either direction. Most imported commodities should remain firm as U. S. purchases pick up.

**But prices will vary widely** behind the over-all average. Metal prices are due for a readjustment. Manufacturers have been building inventories of metals for over a year and a half. Now these supplies are being converted, in increasing quantities, to defense goods.

**As manufacturers liquidate** their inventories, suppliers of basic commodities will have to cut production. Lead and copper will be hit first; then steel—perhaps in early 1953. The impact on aluminum is still further off. Other industrial materials important to the defense program face the same future.

**Readjustments in copper** may be delayed if there is a strike. At present, U. S. buyers are building up inventories of high-priced foreign copper to tide them over a strike period. If the strike does not occur, prices of foreign copper will probably tumble.

**Business activity will remain at a high level** despite the expected difficulties in metals and industrial materials. Textiles, consumer durables, and many imported commodities have already gone through the readjustment period. Consumers are spending more, saving less. High-level—probably rising—defense spending is assured through 1953.

**CHEMICAL INDUSTRY** has been growing more rapidly than all U. S. industry. In the last 25 years, the average growth has been about 9% a year, against all U. S. growth rate of only 3% per year. Mobilization program has helped to spur chemicals growth, but chemicals will keep on growing even

when the defense program ends. Big factor will be replacement of natural materials. Synthetic plastics, expected to become the largest chemical end group, may grow to equal half the total output of the industry. In future, they will compete with steel, lumber, cast iron, glass, textiles, rubber, leather, aluminum, and many other materials.

**Synthetic fibers** are experiencing great expansion, too, but the future market does not loom as large as for plastics. Synthetic fibers are gradually replacing natural fibers, including cotton and wool.

**Surface-active agents are growing rapidly.** Synthetic detergents have already taken 40% of the market away from soap, and consumption is still rising. But eventual saturation of the market is inevitable.

**Long-range prospects for chemicals** are excellent, but the industry has some immediate problems. Construction and labor costs are mounting. And slumps in the chemical process industries hit the industry hard.

**U. S. chemical exports** will feel the effects of competition from revived chemical industries abroad—and the world dollar shortage, which steers buyers away from the U. S. Growing U. S. chemical imports are already beginning to annoy manufacturers here. Last year, U. S. imports of coal-tar products alone climbed to 8.5-million pounds—3-million over 1950.

**New products and processes** are helping solve the world's food problems. Conversion of sewage into algae, by means of oxidation, is being studied by the University of California. Algae contain up to 50% protein.

**Summer slack in egg production** may be eliminated. Tests indicate that use of Aurofac 2-A, an aureomycin-vitamin B-12 feed supplement, can bring low-producing hens back to near-peak production.

**Two new products** for textile manufacturers are on the market. Unirail up-twisters promise many cost-cutting advantages—improved yarn quality, better bobbin build, simpler installation, increased production, lower power and maintenance costs, and longer life. Hydro-Pruf is a new water-repellent finish. When used with thermo-setting resins, it improves crease and abrasion resistance and stabilization.

**World's costliest insecticide,** estimated at $18-million a pound, was produced by the Gulf Oil Corporation. The tiny sample is radioactive and will be used to study how insecticides kill flies and other insects.

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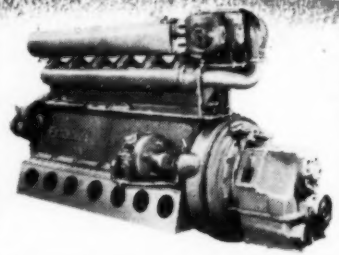

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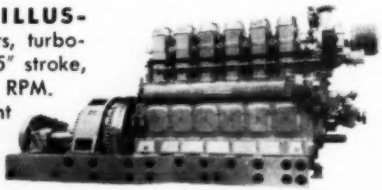

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# WASHINGTON REPORT

**ALL SIGNS** point to a big year for arms-aid shipments and buying abroad. Congressional action on foreign aid during the final sessions showed that Congress was more interested in buying arms abroad for friendly nations than in shipping them overseas.

**Congress has been sold** on the idea of off-shore procurement. It spells more sense to Washington officials to get foreign countries interested in making arms and ammunition than it does if the U. S. makes and ships them abroad. Of course, the U. S. will still have to underwrite original contracts—get the pump primed and the program rolling—for foreign arms manufacture.

**The U. S. will place contracts** in European countries for at least a billion dollars worth of arms during the coming year. That is just about double the off-shore purchases made during fiscal year 1952, which ended last June 30.

**Automotive parts,** aircraft fuselages, and aircraft engines are a few of the main items that will be bought from European manufacturers. There will also be an increase in the manufacture of aircraft spare parts for U. S.-type airplanes. All these spare parts will go to outfitting North Atantic Treaty Organization and other friendly nations that are using U. S. equipment.

**Congress has shown no indication** thus far of granting authority to encourage foreign manufacturers in producting for U. S. forces. First of all there is the Buy American Act that controls such purchases, and secondly, even without legal precedent, U. S. defense officials still feel that the best weapons are made in America.

**Foreign manufacturers** are nevertheless sure to get a big share of arms-aid money in contracts for tangible goods. And it is not likely that Congress will change its intention over the next several years, barring new outbreaks of war.

**But it takes time,** like contracting in the U. S., for production lines to get rolling. Contracts placed this year will be for delivery next year at the earliest. In the meantime, U. S. arms shipments abroad will continue to rise. To date, U. S. arms shipments have totalled more than 4-million tons. Most of that, about 2.5-million tons, went to European nations. But the Middle East and Africa came in for a big share—about 1-million.

Asia got about a ½-million tons. South American countries are still far behind because shipments to inter-American countries did not start until this summer.

**For a while,** it looked as though the U. S. would not meet arms-shipment goals—on purpose. Reason is that European nations were showing signs of not meeting, nor wanting to meet, military-strength goals established at Lisbon last February.

**But programs had shaken down** by mid-summer and what had appeared to be sweeping changes in the 50-division goal for Europe at the end of this year turned out to be only minor revisions. So U. S. officials approved an increase in the rate of arms shipments.

**Total value of arms-aid shipments** to Europe last year came to about $5-billion. It is expected to be almost twice that before next July first. But the determining factor will be how fast the European nations meet military build-up goals because many in Washington feel strongly that European nations must do more to help themselves.

**MIDSUMMER TALKS** of Australian, New Zealand, and U. S. diplomats at Hawaii pointed the way for a new mutual aid program in the Pacific. The U. S. will immediately take over at least one war-time base—Manus, just north of New Guinea. That means a complete refurnishing and reconstruction job there. U. S. contractors will bid on work, but so will Australian and New Zealand concerns.

**There is considerable talk,** too, of taking over the war-time Japanese bases at Rabaul and Truk. Putting either into shape would mean instituting a multi-million-dollar construction program, principally for naval facilities.

**But the big fear in Washington** is possible Red charges of an all-white Pacific Pact. Thus far, military planners see no material assistance in the southeast Pacific coming from Indonesia, the Philippines, or Japan. So that would amount to an all-Western defense agreement. It would fit Red charges of Western colonization of Pacific Islands.

**The State Department is urging** the addition of non-Western countries in Anzus, regardless of their contribution. But the military is holding out for more material gains. State Department will win.

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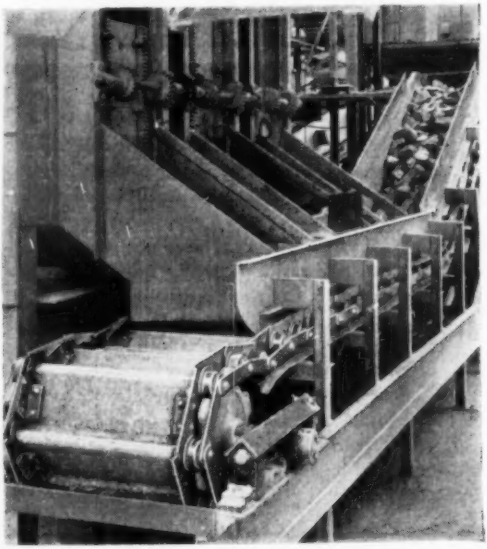

This Link-Belt apron conveyor for handling lime uses long pitch steel chain.

LINK-BELT

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Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.

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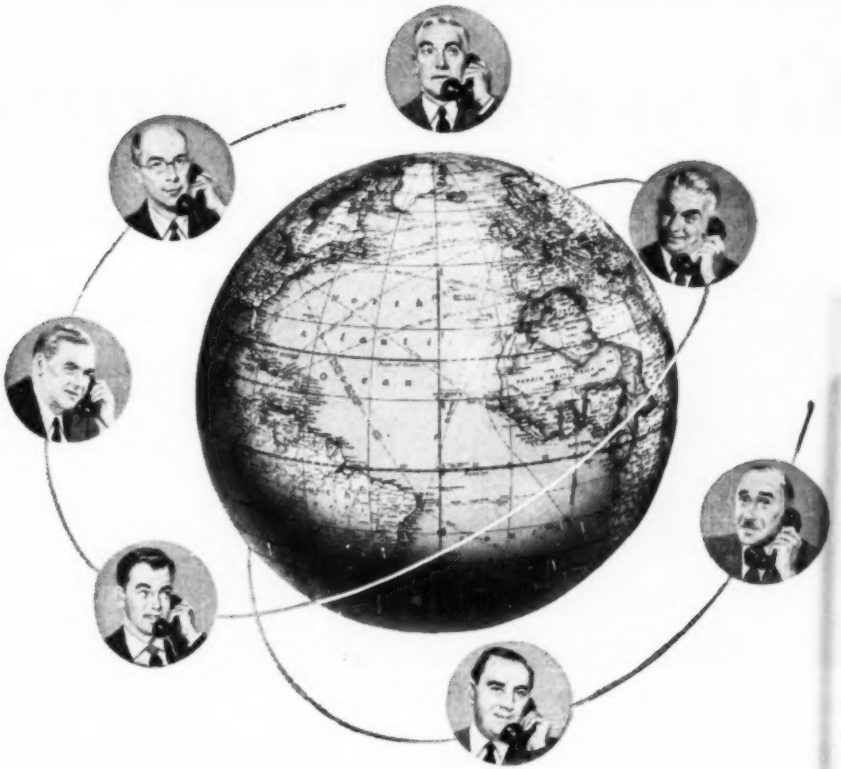
12,926-C



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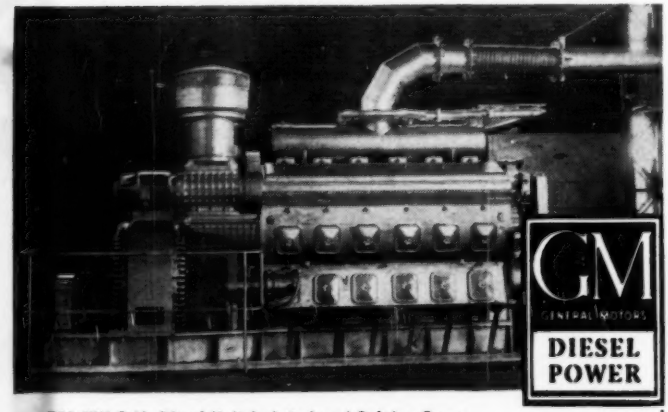
*85,366,264 HP thru June 1952*




*750 KW G.M. Diesel Unit in Interior of Belgian Congo.*

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## GENERAL MOTORS OVERSEAS OPERATIONS
## NEW YORK 19, NEW YORK, U.S.A.

October 1952 • McGraw-Hill DIGEST • Volume 7 No. 10

# Paperwork Aids Maintenance

**Simple paperwork routine for big and small jobs helps stove company keep track of maintenance progress and efficiency**

ONE MEASURE of a good paperwork system is not how few forms it has, but what each form will do. Are all the forms useful? Or are some of them needless red tape? Do they really point up important facts? And is the maintenance department making good use of all those facts?

Perfection Stove Co. asked itself these questions when it decided to modernize its maintenance accounting system. In Perfection Stove's new system, maintenance paperwork has become an important aid in planning, scheduling, and controlling the work of its 40 craftsmen and 25 janitors and laborers.

Here is how its paperwork operates:

**Control**—Records provide work authorization and cost accounting on every job exceeding $10 in cost. Also, partial control over minor jobs under $10.

**Administration**—One clerk prepares individual job records and keeps them up to date. He also handles all maintenance-office routine, answers incoming calls, and serves as job dispatcher. He prepares craft labor-load reports and a monthly report to management.

**Scope**—Perfection Stove handles an average of five new "over $10" jobs every day. About 30 such jobs are in progress at any one time. And about 100 "less-than-$10" jobs get daily attention.

Perfection Stove knows the maintenance costs for all its machines and what repairs were made on each machine. And it can set up a preventive maintenance program as soon as a trend shows up in its records. It knows which phases of the program are successful and which still need attention.

The most difficult problem in setting up a paperwork control system is to make the complications of maintenance work follow a routine pattern. It may sound hard to set up a routine for a hundred different jobs each day. But, surprisingly enough, almost all jobs will find their place.

Perfection Stove's routine begins with the maintenance clerk. He is the starting point for job authorization. He acts in response to any one of several demands for work. Or he may start work on his own accord, such as requesting preventive-maintenance inspections.

Many plant engineers wonder where it pays to separate individual control of maintenance jobs. Perfection Stove settled at $10 and over.

The company has not found the

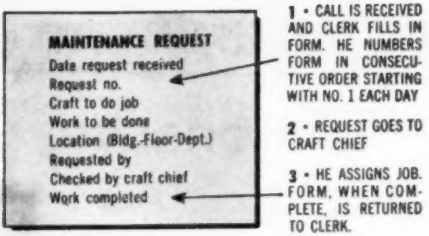

MAINTENANCE REQUEST
Date request received
Request no.
Craft to do job
Work to be done
Location (Bldg.-Floor-Dept.)
Requested by
Checked by craft chief
Work completed
1 • CALL IS RECEIVED AND CLERK FILLS IN FORM. HE NUMBERS FORM IN CONSECUTIVE ORDER STARTING WITH NO. 1 EACH DAY
2 • REQUEST GOES TO CRAFT CHIEF
3 • HE ASSIGNS JOB. FORM, WHEN COMPLETE, IS RETURNED TO CLERK.

FIGURE ONE

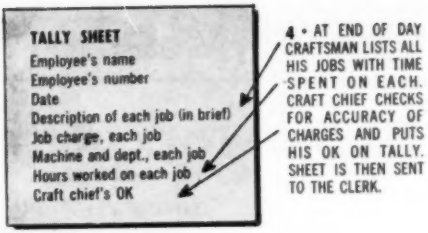

TALLY SHEET
Employee's name
Employee's number
Date
Description of each job (in brief)
Job charge, each job
Machine and dept., each job
Hours worked on each job
Craft chief's OK
4 • AT END OF DAY CRAFTSMAN LISTS ALL HIS JOBS WITH TIME SPENT ON EACH. CRAFT CHIEF CHECKS FOR ACCURACY OF CHARGES AND PUTS HIS OK ON TALLY. SHEET IS THEN SENT TO THE CLERK.

FIGURE TWO

paperwork excessive at the $10 limit. And because repair expenses accumulated by individual machines are derived solely from job orders, Perfection Stove gets a more complete record of machine-repair costs. The problem of controlling costs then means developing suitable separate work-order procedures for jobs under and over $10.

Perfection Stove handles small jobs, such as a call for repair of a leaking faucet, this way:

1. Clerk receives call and notes the details on the "Miscellaneous Maintenance Request Form" (Fig. 1).

2. Clerk places form in plumber's "mail box" where it is soon picked up by the chief plumber. On emergency jobs, the clerk notifies the maintenance foreman or group leader over the public-address system or the call-bell system if he is away from the office.

3. Chief plumber schedules job and is responsible for its completion. Then he returns the request to the clerk.

4. Craftsman who does the job enters data at the close of each day on a "Maintenance Tally Sheet" (Fig. 2) along with other jobs on which he had worked. The charge is against the standing maintenance account of the department involved.

5. Clerk posts total labor hours for each craft, by craft, for the "Minor Departmental Maintenance" breakdown (Fig. 3). This is a daily recap of the time against the various job charges. A separate sheet is kept for each craft. Each week is subtotaled for comparison with the previous weeks. Monthly figures are included in a monthly report to management on the maintenance-department's operation.

Perfection Stove's method of accumulating all minor job charges in departmental accounts establishes a pattern of maintenance requirements that is fairly stable. A glance at the clerk's summary sheet tells if any department is getting out of line. Corrective action can be applied promptly.

Now, let us look at the handling of a large job that needs individual control. Here is how the paper-work system operates.

1. Foreman of toolroom calls maintenance clerk and reports trouble with the magnetic chuck on a surface grinder.

2. Clerk notifies chief electrician. Since the job is not routine, he inspects the chuck personally. He finds a ground in the armature of the d-c.

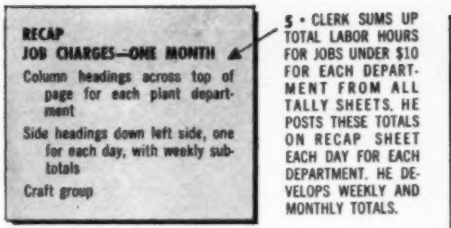

RECAP
JOB CHARGES—ONE MONTH
Column headings across top of page for each plant department
Side headings down left side, one for each day, with weekly subtotals
Craft group
5 • CLERK SUMS UP TOTAL LABOR HOURS FOR JOBS UNDER $10 FOR EACH DEPARTMENT FROM ALL TALLY SHEETS. HE POSTS THESE TOTALS ON RECAP SHEET EACH DAY FOR EACH DEPARTMENT. HE DEVELOPS WEEKLY AND MONTHLY TOTALS.

FIGURE THREE

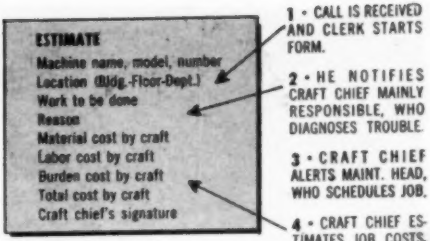

ESTIMATE
Machine name, model, number
Location (Bldg.-Floor-Dept.)
Work to be done
Reason
Material cost by craft
Labor cost by craft
Burden cost by craft
Total cost by craft
Craft chief's signature
1 • CALL IS RECEIVED AND CLERK STARTS FORM.
2 • HE NOTIFIES CRAFT CHIEF MAINLY RESPONSIBLE, WHO DIAGNOSES TROUBLE.
3 • CRAFT CHIEF ALERTS MAINT. HEAD, WHO SCHEDULES JOB.
4 • CRAFT CHIEF ESTIMATES JOB COSTS.

FIGURE FOUR

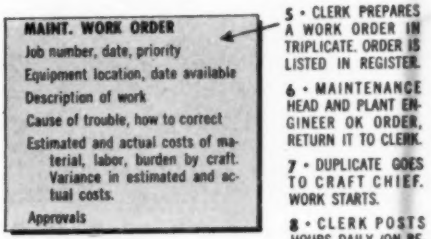

MAINT. WORK ORDER
Job number, date, priority
Equipment location, date available
Description of work
Cause of trouble, how to correct
Estimated and actual costs of material, labor, burden by craft. Variance in estimated and actual costs.
Approvals
5 • CLERK PREPARES A WORK ORDER IN TRIPLICATE. ORDER IS LISTED IN REGISTER.
6 • MAINTENANCE HEAD AND PLANT ENGINEER OK ORDER, RETURN IT TO CLERK.
7 • DUPLICATE GOES TO CRAFT CHIEF. WORK STARTS.
8 • CLERK POSTS HOURS DAILY (ON REVERSE SIDE).

FIGURE FIVE

generator that provides the chuck power supply.

3. Chief electrician realizes the repair job will involve downtime and will run over $10 in cost. So he notifies the maintenance foreman, who decides, after discussing with him, to schedule the repair job at once.

4. Chief electrician estimates job on the "Estimate Data" form (Fig. 4) and gives it to the clerk.

5. Maintenance clerk prepares a "Maintenance Work Order" form (Fig. 5) in triplicate. It is the key form because it tells everybody concerned everything he ought to know about the job.

6. Maintenance foreman and plant engineer check and approve the work order and return it to the clerk. When the estimate runs over $100, approval is sought from the manufacturing committee, a management group. Approval of emergency repairs is left to the discretion of the plant engineer.

7. Clerk gives duplicate work order to the chief electrician, thereby signifying authorization to do the job.

8. Clerk posts hours charged to job daily from "Maintenance Tally Sheet" (Fig. 2) onto the reverse side of the original work order.

9. Chief electrician turns in his copy, as notice, when the job is completed. He notes "Causes of Trouble" and "Recommended Correction" if significant.

10. Clerk sends two copies of the work order to the maintenance foreman and plant engineer for final approval. Both copies go back to the clerk. He sends one copy to accounting to show the job is done.

11. Clerk holds one copy until he receives the accumulated material charges from requisitions sent him by the cost accounting department. Then he files it.

With this system, Perfection Stove knows where and how its maintenance dollar is spent. And it does not get tangled up in needless paperwork. The record of time on every job makes it easy to check progress. —Factory, Aug, p129

***BRILLIANT**, eye-stopping, daylight-flourescent solid-color backgrounds distinguish five different varieties of Kennedy nuts in window cartons. Copy is black and white.*

# For Packages: Colors Glow

**New daylight-fluorescent colors may do for packaging what neon lights did for the sign business. A trend is starting to shape up**

PACKAGING and packaging display received a real boost when the new daylight-fluorescent colors recently were made available for high-speed printing and mass package production. The new colors glow with a flame-like light and are up to four times brighter than ordinary colors. Because they actually emit light, they appear to be lighted from within.

Kennedy Salted Nuts pioneered in packaging with fluorescent colors. It introduced color-coded cartons for its line of products that are packed in glass jars. Window-type cartons, silk screened with daylight fluorescent colors, display the jars. Brilliant gold-orange, red-orange, green, magenta and yellow colors—running the gamut of basic fluorescent shades—are used as a solid overlay of background color on tops and sides of the cartons.

The Close Candy Co. introduced a folding acetate-window carton printed in stripes of a radiant rose hue blended with a conventional dark blue on ordinary board stock. This container is a real trail-blazing, volume-production example of a package with a new, striking color

*GIFT WRAPPINGS gravure printed in fluorescent reds and greens will put a new color note in Christmas packaging. Printed papers will make striking covers for set-up boxes.*

appeal. The slanted vertical-stripe design insures strong brand identification.

**Why the Colors Glow**—Daylight-fluorescent pigments added to printing or coating inks produce the luminous colors. Such pigments convert radiant energy of short wavelengths, such as ultraviolet, violet, and blue into light of longer wavelengths.

All color and all vision depend on the reflection of light. Daylight-fluorescent colors, however, change both visible and invisible rays into extra light output. This increased light output reaches the eye as a super-brilliant color.

**Packaging Factors** — Daylight-fluorescent colors are more effective under fluorescent lighting than they are under incandescent lighting. Also, they appear brightest on cloudy days and do much better at low levels of lighting than ordinary colors. These new colors may lose their intensity in time; this loss may be fast or slow, depending on the thickness of pigment applied and the length of exposure to sunlight. These and similar problems are under investigation.

In general, large-area applications of silk-screened, bronzed or gravure-printed fluorescent colors are indicated. Dark backgrounds provide exciting contrasts and accentuate the brilliance of the fluorescent color. Simple layouts and adequate spacing of design elements and lettering provide maximum impact with the color signal or message. Where exceptionally strong attention-getting packages are desired, fluorescent colors can be combined.—Mod Packaging, June, p87

# Chemical Process Industries

THE NEXT 50 YEARS will bring the chemical process industries problems that will differ significantly from those of the past 50 years.

In the first quarter of this century, production was the goal. Then came the challenge of competition and the need for more efficient processing and more economical distribution. Now the chemical process industries are growing rapidly.

Their future progress will depend on how well the problems that arise are solved. *Chemical Engineering* has asked recognized authorities what are the outstanding problems in their fields. Here are hints to the chemical future:

**Petrochemicals—Technical problems include the development of new processes. Needed is commercial proving of thermal and partial combustion processes for production of acetylene from natural gas hydrocarbons. Calcium carbide will not supply the required increased quantities of acetylene because of power shortages and higher material costs. Also needed is a new catalytic process to carry out dehydrogenation, cyclization, and alkylation reactions to produce olefins and aromatic hydrocarbons.**

PETROLEUM—Several developments are looked for in the next half century: more efficient exploration and production methods; means of cheaply desulfurizing crude oils, thereby cutting costs of building and operating refineries; upgrading of low-return residual oils and very heavy crudes to make them easier to move; upgrading natural gas to liquid products; cheaper methods to produce specific hydro-carbons.

**Chlor-Alkali—Chief problem will be to balance the demand for chlorine and caustic soda to avoid the over-production of the caustic. Several possible ways are to make other types of alkali metals and compounds, use other raw materials (HCl, $CaCl_2$), get away from chlorine in some organic syntheses, change pattern of caustic usage.**

SULFURIC ACID—Meeting the constantly increasing demand despite the sulfur shortage will be the main problem. Solutions may be to turn to sulfides instead of brimstone, produce sulfuric acid or ammonium sulfate directly from gypsum, make a moderate-strength acid by bubbling sulfur dioxide through water in the presence of a catalyst.

# Face These Future Problems

**Synthetic Rubber—Research and subsequent commercial development in the field of elastic polymers will be of great concern. Future progress almost certainly will be rapid. Another demand will be a tire capable of operating safely and continuously at 100 to 125 miles per hr. on the superhighways that will be built. Also needed will be the ability to meet higher speeds, heavier loads, greater impact, and wider temperature ranges for other rubber products.**

PAPER AND PULP—Higher output of better quality wood per acre of treeland may be obtained in the future by development of fast-growing hybrid trees that will be resistant to both insects and disease. Chemical treatments of standing trees will reduce rotting tendencies, make the bark easier to remove, and improve floatability. Economic aspects of pulping may be improved by large-scale utilization of lignin.

**Synthetic Fibers—The outstanding problem will be specialization—the assignment of fibers to best end uses. The concept of a universal fiber will be discarded. Tremendous expansion is coming. Optimum blends of textile fibers, synthetic and natural, will have to be determined. And new fibers will be developed to meet specific textile requirements.**

FERTILIZERS—Research in fertilizers will be directed to crop feeding, nutrient concentration, nitrogen carriers, and processes for acidulating rocks with acids other than sulfuric acid for producing concentrated phosphates compatible with ammoniation requirements. Multiple superphosphates and ammonium phosphates may replace ordinary superphosphate.

**Plastics—New materials and new processes will make better plastics available. End uses will multiply. Building and structural fields will see rapid expansion in their use. Conduit, pipe, partitions, flooring, insulation, furniture, drapes, wall paper, appliances, and fixtures will go more and more into plastics. Chemical process industries will use specially developed plastics to resist severely corrosive conditions. Applications will include storage and processing tanks for acids and alkalis, exhaust hoods, ducts, fans, pipe and sewer lines, valves, and pumps.—Chem Eng, July, p179**

*"You ought to post names of company doctors so we can locate one fast . . ."*

*"Any way you look at it, leadmen are losing 1¢ of their differential . . ."*

## *Company Gives Employees . . .*

# A Chance to Complain

**Company tries periodic employee-management discussions and finds it cuts down on grievances; improves employee morale**

***ROHR CONFERENCE** brings together top company officials and International Association of Machinists (AFL) local executive board members once every 3 months*

*"You could get more production by scrapping some of your old machines . . ."*

*"When you get the new plant, I'd like to transfer. It's nearer home . . ."*

IN MANY COMPANIES management and employees do not get together until complaints have reached the boiling point. By that time it may be too late to avoid serious trouble. Rohr Aircraft Co., Calif., is one company that is trying to lick this situation before it even develops.

Every 3 months, company officers meet with executives of Rohr's union group. The meeting gives employees a chance to tell their pet grievances and to suggest how labor relations can be improved.

The meetings started several years ago when the Rohr director of personnel began meeting with the local-union shop committeemen. He asked them to discuss frankly any shop problems.

The plan had a double intent: (1) to give the personnel director a chance to explain company personnel policies and to get employee reaction to them; and (2) to help him spot brewing troubles in time to avert them.

About a year ago, Rohr's personnel director suggested that similar meetings of top company officials and union people should be held quarterly. At first, sessions were limited to matters not being handled in regular grievance procedures. Later, top-level conferences were opened to discussions on really tough complaints.

Mostly, the sessions are devoted to informal but thorough consideration of anything that might be bothering the parites.

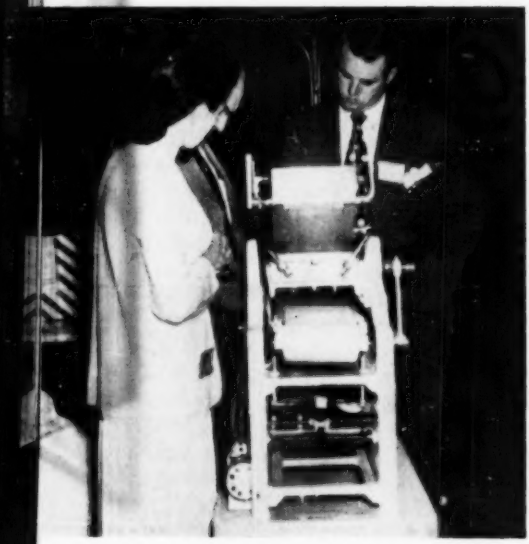
According to both the personnel director and the union, something is done about complaints or suggestions —or the company's reason for not doing so is made clear to the union. This avoids a common pitfall of the conference plan: discussions that lead to no concrete development and so breed union resentment.—Business Wk, July 26, p116

# Progress in

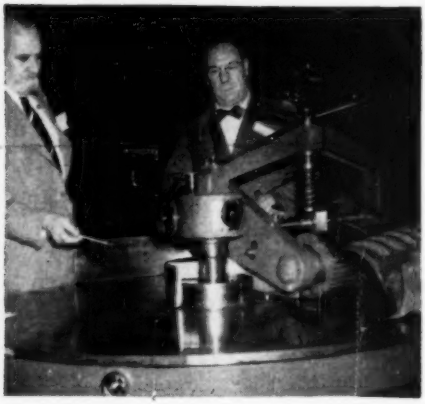
Advanced equipment designs magnetized visitors' attention at National Confectioner's Associa-

CHOCOLATE DIPPER is portable unit run by one girl. It loads 100 centers at a time. Maker is International Research Lab.

CHOCOLATE TEMPERING at 3,000 lb. per hr. is possible with W. Rasch machine made in Cologne, Germany.



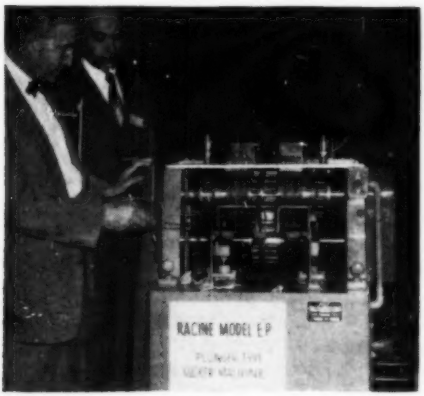
CHOCOLATE DEPOSITOR, shown by Vacuum Candy Machinery Co., is for small plants. It deposits, through three orifices, 180 pieces per min. on a moving belt.



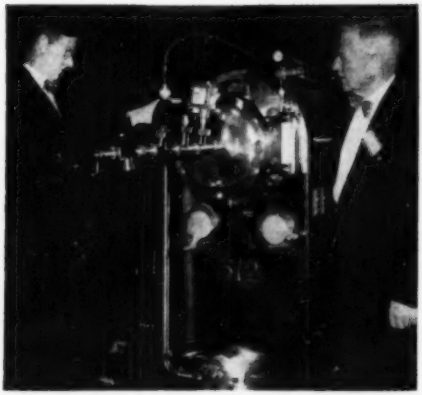
MIXING MACHINE for hard candy handles 125-lb. sucker batch from cooker. It is made with water-cooled slab by Carle & Muntanari Co., S/A (Milan, Italy).

# Candy Making

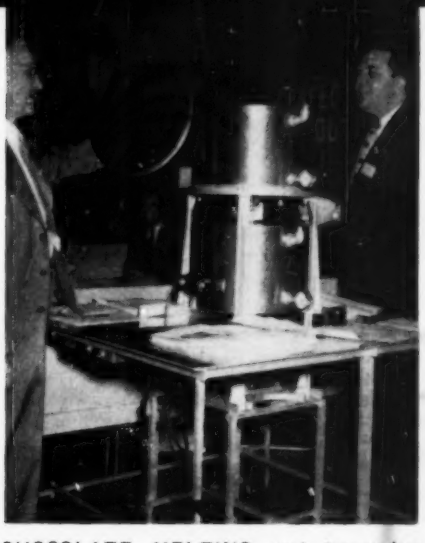
tion show. Outstanding were chocolate and hard-candy machines.—Food Eng, Aug, p94




**LOLLYPOP MACHINE** turns out 800 pops per min. Vacuum Candy Machinery Co. makes this plunger-action machine.



**MARSHMALLOW MIXER** is continuous. It features variable speed controls for pump and rotor drive and a cut-off switch. E. T. Oakes Corp. makes the mixer.



**CHOCOLATE MELTING** and tempering machine, along with dipping table, was shown by R. E. Savage Co.

**WRAPPER** turns out 180 pops per min., but can be adjusted to wrap 100 per min. It includes improved feeder. Wrap-Ade Machine Co. manufactures the machine.

## Liquefied Petroleum Gas May Raise Oil Recovery

New method of oil recovery from depleted reservoirs may be based on injection of liquefied petroleum gas. Primary purpose of the injection would be to store the LPG, which varies seasonally in demand.

As LPG is pumped into the reservoir, it would have a swelling and thinning effect on the residual oil. As a result, substantial oil production should result from typical oils from reservoirs of 10° or higher slope.

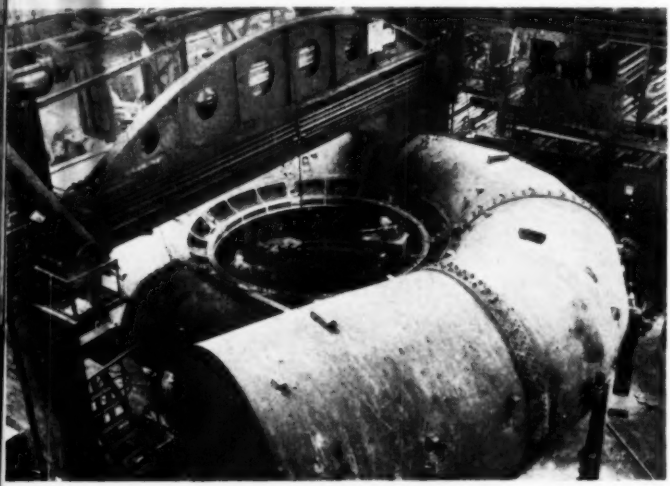
Effect of the LPG would be its absorption from the gas phase into the oil, increasing its volume and thereby the effective permeability of the sand to oil. Viscosity would be substantially reduced, as would be the forces of surface tension, which tend to hold oil in the upper parts of the structure against the action of gravity. So adding LPG would give a large net increase in the gravitational flow.

Laboratory tests indicate recoveries as high as 98% may be obtained by connecting a propane container to a cylinder representing the reservoir and producing from an outlet in the bottom of the cylinder. Comparable recoveries could not be predicted for actual reservoirs, but higher recovery than with other methods could logically be expected.—Oil & Gas J, June 30, p58

## Combines Welding, Riveting

New process, announced by Taylor-Winfield Corp., joins dissimilar metals by combining a spot weld with a rivet. The particular job is to join the steel blade of a plasterer's trowel to a wooden handle having forged aluminum mountings.

Blade and forgings are drilled. A low-carbon flat-head rivet is dropped into each hole of the assembled unit. A bench machine spot-welds each rivet; the flat head contacts the edge of the drilled hole to act as a ring-like projection. The burr is ground off, and the shank of the rivet is then cold-headed.—Weld Eng, Aug, p58



**TRAVELING TOOL BORES CASING**

This turbine casing was too large to swing on a mill. So Dominion Engrg. Works, Ltd. in Montreal mounted cutting tool on a special tool post attached to table, which revolved inside the casing. Stay ring to be machined was made of fine steel castings milled, drilled, bolted together, and rough-bored before assembly. Welding volute casing to ring caused distortion which had to be corrected by machining after assembly. — Am Mach, June 23, p122

## High-Temperature Grease Uses New Gelling Agent

Copper phthalocyanine, once used only by the pigment industry, now seems destined for a new, more versatile existence. A lubricating grease developed at U. S. Naval Research Laboratory contains copper phthalocyanine as the gelling agent.

The new grease possesses superior heat resistance. It works well from —80 to 400° F.; this is well above the high-temperature limit of 300° F. for greases in the past.

Above that temperature, common soap gelling agents decompose and thin, thus making conventional greases useless. But with phthalocyanine, stability of the oils, not the gelling agent, sets the limit. Phthalocyanine does not decompose, even to 900° F. temperatures.

Other advantages of the new grease are low bleeding rate and resistance to softening at high temperatures and longer storage life because of lower sensitivity to oxidation.

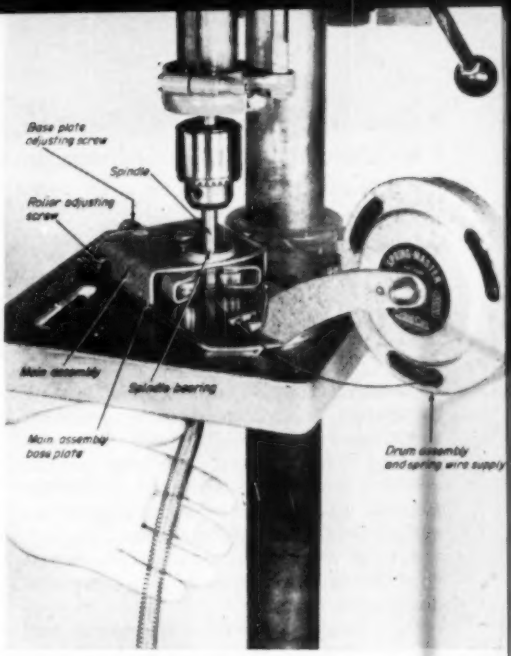
The grease was developed primarily for the U. S. Air Force but also interested are manufacturers of electronic devices, electric motors, optical instruments, chemical processing equipment, and ball bearings. Cost is still unknown; estimated price is about $5 a lb. --Chem Wk, July 5, p37

## Holds Steam Temperature

Practically all utility boilers have means for maintaining a constant steam temperature over a wide load range. One such means is gas circulation; a portion of combustion products is taken from a relatively cool temperature zone —usually the boiler or economizer gas outlet—and is recirculated to the furnace. The gas modifies heat absorption by furnace walls, thus controlling the quantity of heat in the gases leaving the furnace.

Gas circulation is particularly effective at high temperatures because gas can be recirculated at full load. This method has the effect of sizing the superheater and reheater at some load in excess of full load. The furnace-exit gas temperature therefore can be maintained at a lower level.

The gas-circulation method may become more prominent if fuel costs continue to increase and superheat and reheat temperatures are limited by materials.—Elec World, July 28, p92




DRILL PRESS MAKES SPRINGS

**Simple attachment called Spring-Master adapts standard drill press for making coil springs. It consists of wire drum, guiding device to convert wire to coil form around spindle grooved to four coil diameters, and rollers adjustable for spacing to fit wire size. Finished spring moves downward under table. DoAll Co. makes the attachment. —Prod Eng, Aug, p143**

▶ Good resistance to corrosion, heat, moisture, and chemicals
▶ Outstanding flexibility and adhesion, high abrasion resistance
▶ All these added to good color retention are featured by . . .

*Newer Types of . . .*

# Organic Protective Coatings

CONSTANT NEED for more effective and prolonged protection of metal surfaces stimulated the development of newer coating materials. Among them are the resins or film formers, including alkyds, polyethylene, epons, acrylics, ureas, vinyls, and others.

Use of these organic coatings is not confined solely to protective purposes. They give a variety of colors and specialty finishes. Their colorability and protectiveness make them ideal for many industrial and consumer products.

**Alkyd Resins**—Most common of the film formers, the alkyds adhere excellently and, when properly pigmented, provide attractive finishes of depth and high luster. Adding styrene to alkyd resins gives them about the same drying powers that cellulosic lacquers have. Styrenated alkyds dry within an hour and often without the addition of metallic driers. They also produce a hammer-tone finish when pigmented with aluminum powder or paste and pastel-colored pigments.

Another modification is the silicone-alkyds. Advantages of adding silicone are improved hardness and high resistance to heat, humidity, chemicals, and salt spray. Silicone alkyds are suitable for space heaters, transformers, motors, chemical processing equipment, refrigerators, stoves.

**Teflon**—Polytetrafluoroethylene, or Teflon, finishes are not yet available in production quantities. They are limited to research applications. Two Teflon base primers are in use as protective coatings, one for steel and other for aluminum. Good adhesion is obtained on nickel and sandblasted glass.

**Epons**—A new class of condensation polymers is marketed under this name. When heat cured, they exhibit unusual flexibility, hardness, and adhesion. Epons may be used alone or modified by reacting them with vegetable oils or their fatty acids.

As Epons can be air dried, they find use for floor varnishes. Heat-cured films are suitable for metal decorating, appliance finishes, farm implements, and industrial primers. Other uses: dairy, brewery, paper equipment.

**Acrylics**—The acrylic resins are Lucite and Plexiglas. In the past, cost has limited their use as protective coatings, but progress has been made in bringing their cost down.

Industrial uses include clear coatings for metals, fume-proof and heat-resistant enamels, adhesives and cements, vehicles for luminescent pigments, electrical coatings, and shatter-resistant glass coatings.

**Urea-Alkyds**—Combining alkyd resins with urea-formaldehyde or melamine resins gives high gloss, depth, extremely hard porcelain-type finish. Adding alkyd resins to the other resins improve the latters' film characteristics. Example: finish on refrigerators, washing machines, gasoline pumps.

Ranking high among new developments in this group are urea formalde-

hyde and triazine formaldehyde resins for use in baking finishes applied to automobiles, farm equipment, and home appliances.

**Vinyl Resins**—For surface-coating fields, these resins are thermoplastic, neutral, nonoxidizing, and nonpolymerizing in nature. Complete absence of taste, odor, and toxicity makes them well suited for coating food and beer cans, bottle-cap linings, and closures and coatings for food wrappers.

Toughness, adhesion, and flexibility of vinyls allow them to be coated on flat metal sheets that are to be drawn, stamped, or otherwise formed. Exceptional resistance to corrosive chemicals leads to their use in chemical containers, for stop-off lacquers in electroplating, and in processing vats.

Other applications: on masonry, asbestos board, cement board, table tops, bar tops, refrigerator parts, metal signs, garden furniture.

Vinyls may be applied as dispersions in organic media or water, as organosols (on cloth, paper, dipped goods, metal foils), as plastisols (for heavy flexible coatings), and as strippable films (for storage and shipping purposes). Recent development based on vinyls is anti-corrosive wash primer or undercoat consisting of vinyl butyral resin, zinc chromate, and phosphoric acid.—Prod Eng, Aug, p165

## Design Ideas Improve Electronic Systems

Examination of over 200,000 reports on equipment failures in the field showed Hughes Aircraft Co. no outstanding cause but indicated that the following should be considered by electronic engineers:

1. Inserted-tab-construction capacitors should not be used below an applied voltage of 10 volts as they may open. A resistance may build up between tab and foil and not break down at applied voltages of less than 10 volts.

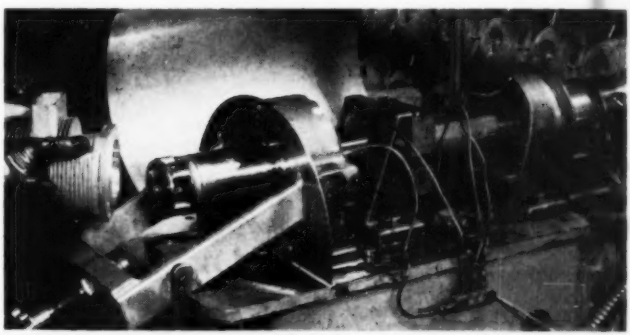
2. Low temperatures during shipping or storage may permanently damage certain wax-impregnated circuit components.

3. Metallized capacitors should not be used in high-impedance circuits. When they short through a pinhole or impurity, the current may be too low to burn out the shorts. Neither should metallized capacitors be installed in pulse-sensitive circuits where sparking inside the capacitor may generate false pulses.

4. If parts are not completely hermetically sealed, they should be left open. Changes in humidity, temperature, and altitude may cause moisture to collect in such parts.—Electronics, Aug, p224

**KNURLS CYLINDER**

**Before engine cylinder for power saws made by McCulloch Motors Corp. are chromium-plated, they are knurled inside. Purpose is to provide identical reservoirs for oil, thereby improving wear resistance of plated surface. Special machine knurls to 0.007-in. depth before honing. Air cylinder feeds tool to depth.—Am Mach, Aug 4, p101**



**BABY BOMBER**

**Designed to hit enemy ground installations, "baby bomber" is only 30 ft. long, has a 250-hp. engine and weighs 2,500 lb. fully loaded. Maker, Fletcher Aviation Corp., calls this one a "Flying Tank Buster". — Auto Ind, Aug 15, p17**

## Three Winch Trucks Realign Slipped Slabs

Connecticut State Highway Dept. has a simple method to re-position concrete highway slabs after they have slipped out of line along the center longitudinal joint. Some slabs laid years ago over unstable ground slipped as much as 4 in.

The crew first mud-jacks out-of-line slabs. The slab is made as free as possible and all joints are cleaned.

Heavy moving equipment consists of three trucks with power winches; three sets of three and two sheave blocks; three sets of snatch blocks; three sets of steel hooks; and three sets of steel pins with welded braces.

One hook is placed against the slab edge about 13 in. from one end. Another hook is placed on the opposite side of the pavement about 13 in. from the end of the slab adjoining the twin of the slab to be moved. This creates a diagonal pull against two blocks. A similar hook-up is installed at the other end of the slab, and a third set of hooks is placed across the center of the slab to expert pull straight across the pavement.

One truck is stationed 100 ft. from one end of the slab, and the other two about 100 and 150 ft. from the other end. The three trucks pull simultaneously, and the slab is brought back laterally into position, closing the center gap in the highway pavement.—Const Meth & Equip, Aug, p68

## Vinyl for Protection

New applications are appearing for the vinyl spray coating developed for protecting machinery and equipment in "Operation Mothball".

The material, trade-named Cocoon, is made by R. M. Hollingshead Co. Cocoon seals roofs and sidewalls against water, weather, mildew, salt spray, and fumes better than any other commercial process. The coating is applied with a spray gun and sets in 20 min. to form a smooth, continuous seal.

It can be applied over concrete, gypsum, steel, wood, insulation, or even an old built-up gravel roof. It molds itself onto the material, caulks all cracks and openings, and forms its own integral flashing around windows, skylights, parapets, and other joints. It expands or contracts with any movement of the building, even at sub-zero temperatures, and will not get tacky at 180° F.—Mod Plastics, July, p95

## Forming Aluminum Alloys at Elevated Temperatures

High-strength aluminum alloys, such as 75S, are easier to form when they are hot. The greatest gain in formability is obtained with annealed material formed at 450 to 500°F.

Elongation in extreme cases runs as high as 90%. One operation can accomplish the forming that would require several stages at room temperature.

The improved ductility gives these advantages from a design viewpoint: (1) new concepts of design become possible; (2) parts can be larger; (3) material can be thicker and it draws better.

Alloys are heated in two ways—by applying heat either to the part or to the tools, which then heat the part by conduction. Parts can be heated directly by soaking in hot-air oven, immersion in hot oil, radiant heating, resistance heating, or infrared lamps. The method should be selected on the basis of heat-transfer rate, handling convenience, quantity of parts, and avoidance of undesirable metallurgical characteristics, such as internal stress, intergranular corrosion, or loss of strength.

Best temperature to use depends on material, desired ductility, and time held at temperature. Excessive temperatures reduce the strength. A radical loss occurs when parts are held over 400°F. for more than 1 or 2 min. —Prod Eng, July, p163

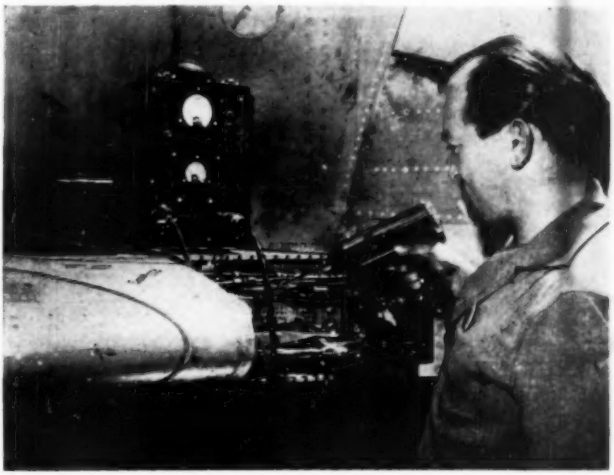
## One-Operation Coating

Combining three operations into one at the Cleveland-Cadillac tank plant has cut the time needed to clean and prepare tank hulls and turrets for painting. The cleaner, developed by Whitfield Chemical Co., removes grease and tar, cleans off loose scale, soot, and sand, and produces, at the same time, a phosphate coating on the steel parts.

The solvent is applied by spraying, plus brushing where tar has accumulated. After a 5- to 10-min. reaction time, parts are rinsed with water and air dried.—Iron Age, July 31, p98

**DETECTOR CHECKS FUEL SYSTEMS**

**Pistol-like leak detector checks aircraft fuel cells at North American Aviation, Inc., quickly and accurately for leaks. Detector, developed by General Electric Co., is sensitive to halogen. Small amount of halogen is injected into fuel system prior to its installation. Pressure on system then forces halogen out and exposes any leaks to detector. — Elec C&M, July, p306**



# TECHNICAL SHORTS

**Silicone Grease**—Niagara Mohawk Power Corp. uses Dow Corning DC-4 silicone grease on electrical contact surfaces. Benefits are (1) improved conductivity by reduction of oxidation, (2) protection against moisture, (3) easy application in hot or cold weather.—Elec World, July 14, p170

**Molds for Overseas**—Lists of used molds available for sale or lease abroad are maintained by International Plastics Service, Beverly Hills, Calif. Molds listed are steel molds made in the U. S. that are outmoded or not in use.—Mod Plastics, Aug, p148

**More on Transistors**—Important recent news is that point-contact transistors can be made to oscillate at frequencies in 100- to 200-megacycle band. Transistor is now able to replace tubes in new areas of application.—Electronics, Aug, p10

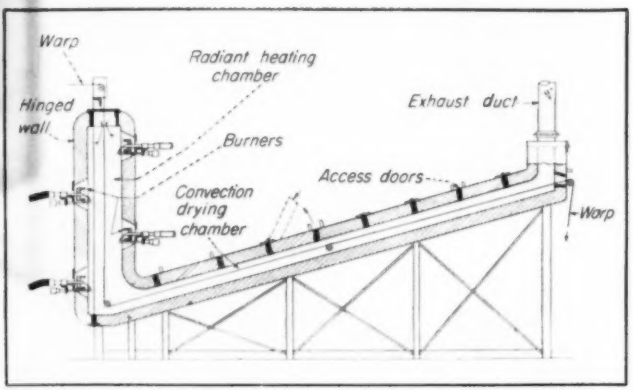
**Interchange of Engineering Talent**—U. S. Bureau of Reclamation's Denver, Colo., offices and laboratories have 50 engineers from 11 countries studying U. S. methods. Engineers come from Australia, Thailand, India, Turkey, Burma, Pakistan, Venezuela, Brazil, Nepal, Iraq and Iran.—Eng News-Rec, Aug 14, p60

**Controls Elevators** — Radioactive substances are being applied to elevator control devices. Modified Geiger cell attached to elevator spots radium capsule on shaft and actuates stopping mechanism. Platform stops within 0.05 in. of floor.—Chem Wk, Aug 2, p51

**Speeds Report Making**—Tape recorder at Western Printing & Litho Co. solves problem of passing on information between shifts. Instead of writing a lengthy report, out-going supervisor records report on tape machine.—Factory, Aug, p98

**Diesels Going Up**—Diesel-powered trucks now account for 22% of heavy-duty trucks in the U. S.—up from 5% in 1946. Because of greater initial cost, as compared to gasoline trucks, diesel trucks must run at least 50,000 miles a year before they become practical from economy viewpoint.—Iron Age, June 26, p74

**Fixtures Last Longer**—Ceramic coatings applied to furnace fixtures at Solar Aircraft Co. lengthen their lives four to five times. Coatings are thin, usually 0.002 in. thick. Fixtures used regularly in ceramic firing furnaces need recoating every 3 months.—Am Mach, July 21, p101




**SLASHER DRYER**

Engineers of Southern Regional Research Laboratory have designed a slasher that has a gas-fired, infrared drying unit to process warps on a pilot-plant scale. Intense heat will not damage cotton yarn so long as the yarn is saturated with water. Heating chamber is at left. Drying area is in center. Hot air and warps are drawn off at right.—Textile World, Aug, p143

**Safer in Industry**—Figures released by National Safety Council show communication industry had the lowest frequency and severity rates for 1951. Pulp and paper industry ranked 24th in frequency and 21st in severity. All-industry frequency rate was 9.06 (number per 1-million manhours) and severity rate 0.97 (days charged per 1-million manhours).—Paper Ind, July, p508

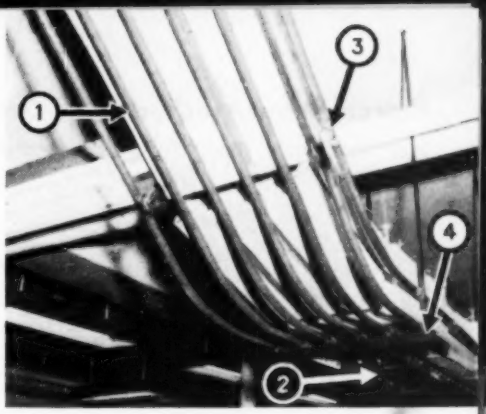
**Predicts Aluminum Radiator**—Aluminum Co. of America predicts that an aluminum radiator for cars may be ready within the next 5 years. Company says that an aluminum brazing sheet, recently developed, offers satisfactory protection against corrosion.—Auto Ind, Aug, p17

**Belt May Replace Subway** — Goodyear Tire & Rubber Co. is experimenting with an endless belt railway (McG-H Digest, June '51, p34) to replace New York City's 42nd St. shuttle subway. Passengers would ride in small cars carried on a pair of endless belts. Cars turn around on large horizontal wheels at each end.—Businses Wk, July 26, p28

**Coating Thickness**—Recent research indicates that organic-coating thickness should be at least three times the profile depth to resist moisture penetration. Unsatisfactorily protected peak positions quickly turn into centers of failure.—Chem Eng, June, p201

**Ski Hoists Hauls Miners**—Miners at Gary No. A mine ride in comfort up from lower portal to bathhouse on mine's exit level using ski hoist installed by company. The hoist is similar to those found at winter resorts.—Coal Age, Aug, p121

**Spent Alkali Neutralizes Acid**—Acid and alkaline wastes at a New England finishing plant are neutralized with a pH-control system. Separate wastes are collected in equalization tanks. Regulated flow of acid waste is mixed with alkali to create neutral pH condition. Effluent is further treated on trickling filters. Control is automatic. — Textile World, Aug, p163




BENT-PIPE BOX CHUTE

At Armour & Co., Salisbury, Md., a box chute has been made from a few lengths of pipe (1) curved at the discharge end to direct boxes onto overhead roller conveyor (2). Guides (3), also made of pipe, are welded to uprights from outside pipes. Angle-iron cross-members (4) at each end of chute support and space pipes.—Food Eng, July, p9

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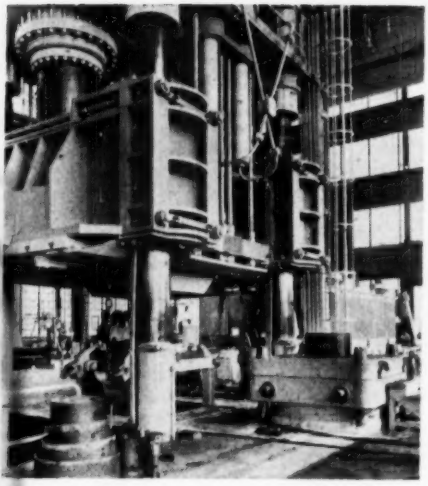
**Save Stored Products** — Experimental work by Shell Oil Co. shows that storage tanks containing volatile products should be painted white to reduce evaporation losses. In severe corrosive conditions, best compromise is to paint sidewalls white and the roof aluminum.—Oil & Gas J, July 14, p125

**High Fluorescents**—Bank lobby has new louverall ceiling 50 ft. from floor—the first successful use of fluorescent lighting at so high a mounting height. Lamps are 96-in., 75-w. slimline units installed on 7½-ft. centers. Louvers are 6x6x3 in. Lighting intensity obtained is 70 foot-candles.—Elec C&M, Aug, p60

**Unpowered Control Systems** — Aerodynamicists are working to get back to unpowered control systems for higher-speed aircraft. Major companies are placing special stress on the avoidance of power boost controls wherever possible. Engineers are well along with several types of aerodynamically balanced flaps with goals of improved control effectiveness and lessened stick forces.—Aviation Wk, July 28, p11

## *Pierce-Draw Method Was Developed by B&W To Make . . .*



***INGOT PIERCING** is first step in making large hollow forging. Heated ingot is centered in press pit under vertical punch.*

***PUSHING PIERCED INGOT** through series of forging dies is done on push bench by mandrel fitting inside the ingot.*

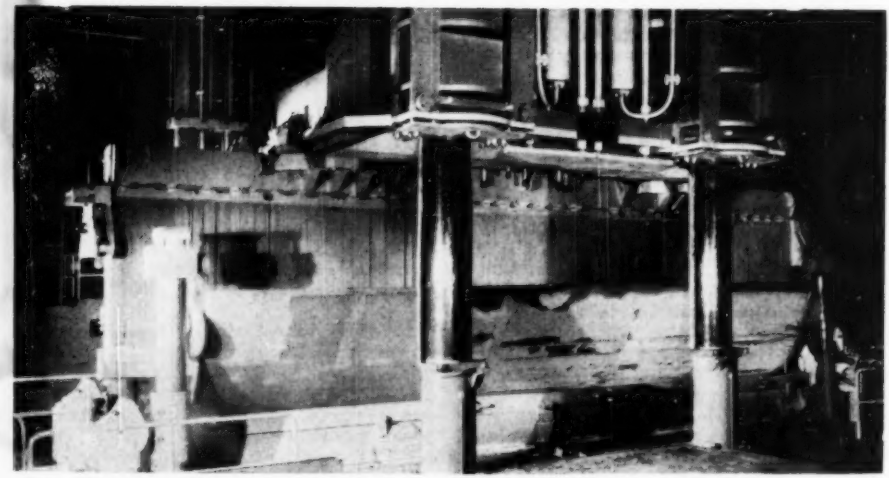


***PLATE BENDING**, even of this 6¼-in. thick, 43-ton carbon steel plate, is also possible on 6,500-ton hydraulic press. Plate, 10 x 36 ft., is heaviest section ever rolled. Using such large plates eliminates several circumferential welds in making boilers.*

# Large Hollow Steel Forgings

**New method replaces less efficient ways to manufacture headers for high-pressure steam equipment and other pressure-vessel units**

HEAVY-WALL STEEL FORGINGS with 8- to 26-in. ID., ¾- to 4½-in. wall thickness, and up to 22-ft. lengths are made by Babcock & Wilcox Co. at its Barberton, Ohio, plant.

The pierce-and-draw manufacturing method was developed by the company primarily to produce headers for high-pressure steam-generating equipment. It is expected also to be an economical way to make accumulators, pressure vessels, heat exchangers, large bearing races, and other hollow forgings. Previously, headers were made by rolling and welding steel plate or boring out solid forgings.

The press is a 6,500-ton hydraulic unit designed in cooperation with Hydropress, Inc., and built by B & W. The capacity can be intensified to 8,500 tons. Operating pressure is 3,000 lb. per sq. in. The movable platen is mounted on spherical bearing surfaces that allow a tilt of ½ in. at the outer edge to compensate for unequal loading of the ram.

### *Pierce-Draw Procedure*

The cropped ingot, weighing up to 13 tons, is heated to 2350°F. in a car furnace, descaled, and placed vertically in a matrix mounted on rails in the press pit. A blunt-nosed piercing punch, mounted centrally on the movable platen and coated with a mixture of grease and graphite, pierces the ingot to within a few inches of the bottom.

A stripper plate, clamped to the matrix, strips the ingot from the punch. The matrix table then retracts to the rear of the press, and a 500-ton ejection ram then strips the matrix from the ingot.

The pierced ingot is moved by crane to the push bench and placed on its roller supports. A mandrel enters the ingot and pushes it through the first die ring. The 30-ft. stroke of the bench permits more than one die to be stationed along the frame. Both mandrel and dies are lubricated with a mixture of grease and graphite.

### *Reduction per Pass Limited*

Reduction in area per pass is about 20%, but reduction in diameter never exceeds one-third the mandrel diameter. If too much reduction is tried in one pass, the mandrel will push through the end of the work.

After the last reduction in a series, a yoke is dropped over the mandrel in front of the last die and the ram is retracted to strip the forging from the mandrel. The forging must be stripped before its temperature drops to 1800°F. to avoid seizing to the mandrel.

After the first series of reduction, the forging is then inspected for defects. Inclusions and flaws are chipped out before reheating.

Mandrels and dies can be round or in simple shapes. Carbon and alloy steels, including stainless, can be forged successfully.

A second shifting table equipped with 42-ft. bending beams converts the vertical press to a press brake for forming large plate sections. Plates up to 2¾ in. thick are formed cold. Heavier plates are rough-formed at forging temperature, then finish-formed cold. To handle such large work, four manipulators are needed, one at each corner of the table. Each can handle 35 tons.—Am Mach, Aug 4, p146

## Continuous Process Makes Frozen Pineapple Juice

Pineapple juice is the latest addition to the growing list of frozen concentrates. Processing will be done in seven steps in Hawaiian Pineapple Co.'s new million-dollar addition to its fruit cannery:

1. Juice is extracted and centrifuged.
2. Heat treatment inactivates the bromelin enzyme.
3. Some juice goes to storage for later use in blending. Remainder is pumped to high vacuum, low-temperature, triple-effect evaporator for concentration.
4. Volatile esters are collected in second- and third-effect condensates and recovered by distillation in vacuum fractionating column.
5. Partially processed juice is pumped back into triple-effect evaporator and concentrated to 66° Brix.

LONG-LASTING THRESHOLD

Attractive, durable threshold is made of Strata-wood, a material made by impregnating wood veneers with phenolic resin and curing them under heat and pressure. Material, known as compregnated wood, retains beauty of natural wood but is far harder, denser and abrasion-resistant. Formica Co. makes the threshold in a variety of sizes.—Mod Plastics, Aug, p94

6. Single-strength cutback juice and volatile flavor concentrate are added to 66° Brix concentrate to produce final product of 47° Brix.
7. Product is filled into 6-oz. cans and quick-frozen in an air-blast tunnel operating at −40°F. Frozen juice is cased and stored in cold storage held at −10 to −20°F.—Food Eng, Aug, p72

## Neoprene Protects Metals

Neoprene rubber acts as a suitable protective coating on machines and other equipment against corrosion. The need for oven curing has limited its use, but a recently developed neoprene solution that cures at room temperature will make it practical for many new uses.

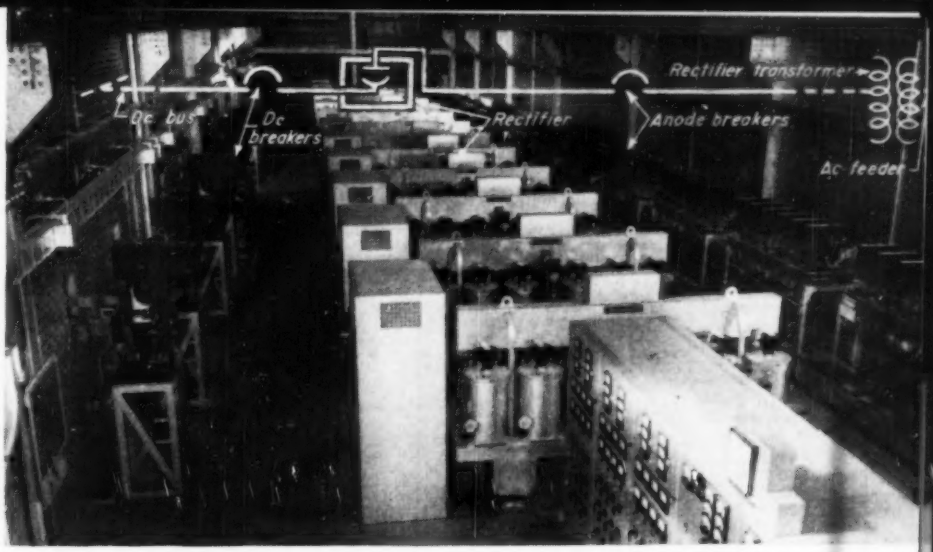
The new solution, known as type KNR, cures in 24 to 48 hr. It has the same chemical resistance and practically the same physical properties as the conventional neoprene solution. Adding an accelerator causes KNR to cure at room temperature.

The accelerator is added to the coating just before its application. Otherwise, the material would jell in the can. The new neoprene solution is made by Du Pont.—Prod Eng, Aug, p138

## No Need To "Freeze" Rubber

Five years of research by Firestone Tire & Rubber Co. have solved the problem of making "cold" rubber without cold. A chemical compound, Nitrazole CF, acts as a polymerization catalyst that puts butadiene and styrene together "hot" (122°F.) the same way as the current process does "cold" (41°F.).

Use of Nitrazole CF (p-nitrobenzene diazonium p-chlorobenzene sulfonate) gives a product comparable in abrasion resistance. It was in this property that cold rubber proved superior to the older GR-S synthetic rubber.—Chem Wk, Aug 2, p61




***MERCURY-ARC RECTIFIERS** are here banked parallel on direct-current bus. Stepdown transformers feed anodes on each bank through circuit breakers. Cathodes feed bus.*

# Power-Rectifier Progress

**Mercury-arc rectifiers still supply most of present needs for direct current but other types are finding wider application**

ELECTRIC POWER TODAY is generated, transmitted, and distributed as alternating current. But many applications —electrochemical industry, electric railways, rolling mills—need or prefer direct current. So converting or rectifying ac. to dc. is an important task.

The mercury-arc rectifier, developed about 50 years ago, supplies most of the dc. Advantages include quiet operation, simple switching, easily controlled voltage and current.

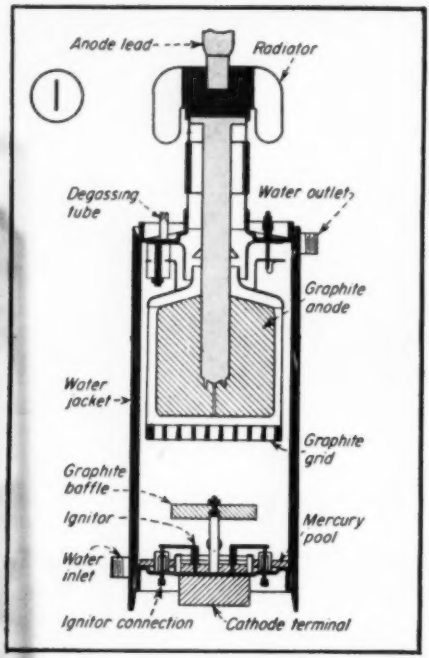
Before 1937, all commercial units were multi-anode. Development of the more efficient single-anode rectifier (first the ignitron, later the excitron) broadened use in lower voltage range—from 200 to 300 volts.

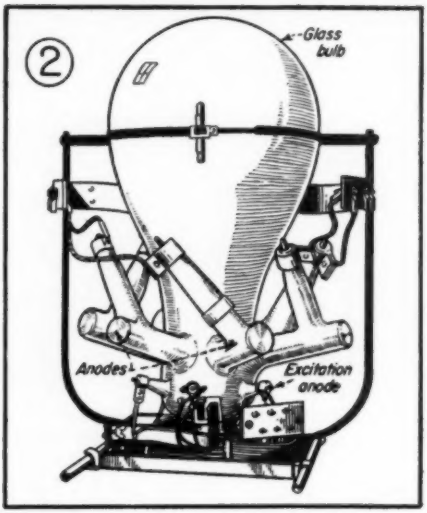
Railway service was for many years the largest field of use for mercury-arc rectifiers, but was supplanted about 1940 by the electrochemical industry. Single-anode and sealed-tube units helped push rectifiers into general industrial applications.

They supply dc. in steel mills, foundries, smelters, paper mills, rubber mills, printing plants, metal-fabricating plants. The dc. feeds cranes, conveyors, electromagnets, coal handling equipment, machine tools. For just main roll drives in steel mills, capacity is about 90,000 kw. An interesting application —at two plants of U. S. Steel Corp.— is in electronic frequency converters; rectifiers connect 25- and 60-cycle systems.

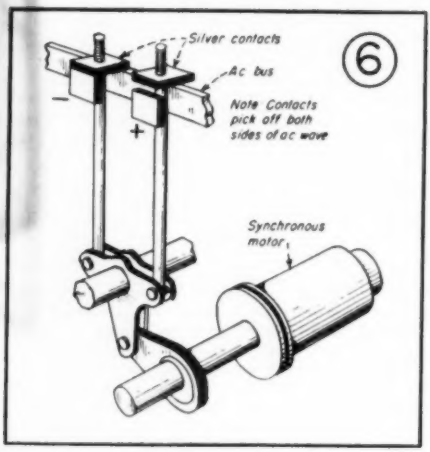
Other types of power rectifiers are hot-cathode tube, metallic, and mechanical—as shown on the next two pages.

## *Power Rectifiers of Several Types Serve . . .*



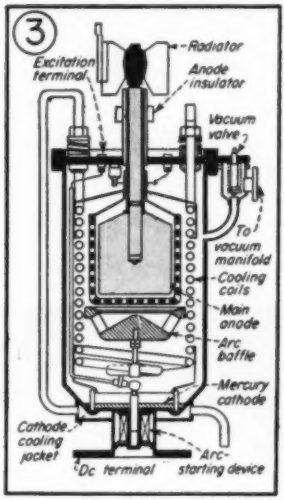



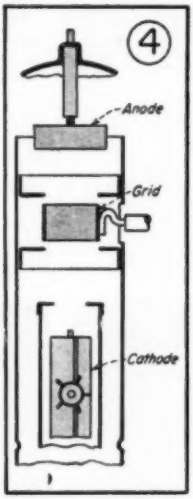

**1 Ignitron**—Distinguished feature of this single-anode mercury-arc rectifier is a small stationary electrode immersed in the cathode pool. This ignitor vaporizes mercury and starts the cathode spot; then the heavy graphite main anode can pick up and conduct in one direction. Single-anode rectifiers have current ratings from 100 to 1,000 amp. at 250-volt dc. High-voltage units range from 50 to 150 amp. at voltages up to 18 kv.

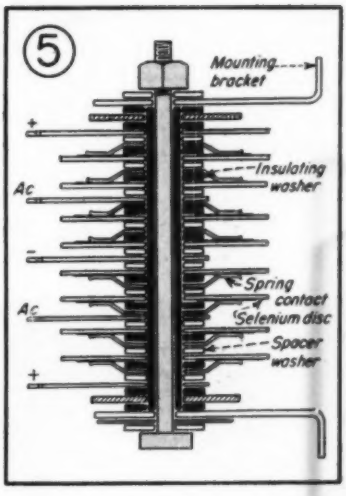



**2 Glass-Bulb Rectifier**—This unit, a multi-anode rectifier, is used widely in Canada and Europe. It is a glass vessel, highly evacuated except for mercury vapor. Within the bulb are anodes, mercury pool, electrodes. A new European design groups all anodes in one quadrant, thereby saving space as four 165-amp. bulbs can be grouped in 54-in. square cubicle. One reason for use of glass bulbs in Europe is lower cost compared to steel tanks.

## . . . Railway, Electrochemical, Other Industries



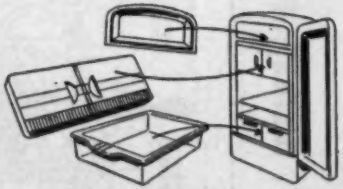

**3 Excitron**—This single-anode mercury-arc rectifier differs from the ignitron in that the cathode spot is maintained continuously on the mercury surface, while the rectifier is operating by a pilot arc from excitation anode. Like the ignitron, the excitron is assembled in a group of 6 to 12 tanks, depending on rating and number of phases. Output voltages range from 230 to 1,750. Capacities run from 150 to 8,000 kw. Cooling coils carry off heat.

**4 Hot-Cathode Rectifier**—Tube elements are oxide-coated cathode electron emitters, mercury vapor, anode, and grid. Typical example is the thyratron tube. It can control low currents—110 to 220 volts—with low arc losses. Primary job is to give variable-voltage dc. for relay, saturable reactor, or motor-field or armature control. Best performance and longest life are realized when cathodes are continuously energized; unless off-time is over 6 to 8 hr.

**5 Metallic Rectifier**—Three well-known types are magnesium-copper sulfide, copper oxide, and selenium. Basic elements are good conductor, semi-conductor, and barrier layer. Advantages are ruggedness, no filament excitation, no time delay in operation, long life, high efficiency. Typical applications are battery charging, high-voltage rectification for precipitators, resistance welding. Newcomer to the field is the germanium rectifier.

**6 Mechanical Rectifier**—Rectifying element is set of contacts driven by synchronous motor. Dc. is produced by connecting a-c. and d-c. systems when a-c. sine wave is in desired position. Contact is broken when a-c. phase reverses. Mechanical rectifier is built to deliver from 3,000 to 10,000 amp. in a single unit. Primary use is in electrochemical field. Units cannot accept regenerative loads. Contact life could be better.—Power, Aug, p84

LOOK TO
DOW
for high
quality
chemicals



**PLASTICS**

Styron (Dow polystyrene) is a thermoplastic material widely used to manufacture such items as lighting fixtures, radio cabinets and house-

*with*

# DOW *latexes*

There is a tremendous consumer demand for the new latex paints in home and industry. And no wonder—these new paints made with Dow latexes are easier to apply, free from the usual paint odor and extremely fast drying.

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In the paper industry manufacturers have found that Dow latexes enable them to give their products a variety of finishes that assures the very finest surface for reproduction.

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thermoplastic material widely used to manufacture such items as lighting fixtures, radio cabinets and household refrigerator parts. Other valuable Dow plastics include Ethocel (Dow ethylcellulose), a tough plastic that combines lightness with good shock resistance; Saran for extruding and weaving into seat covers and screens; Saran film used for attractive packaging.

**AGRICULTURAL CHEMICALS**

To help farmers raise more and better crops and livestock, Dow manufactures such products as weed and grass killers, insecticides, fungicides, soil and grain fumigants, plant growth regulators and veterinary chemicals. Extensive research and expanding production by Dow are furthering agricultural progress all over the world.

*DOW produces more than 600 chemicals including industrial and agricultural chemicals . . . fine chemicals for the pharmaceutical industry . . . chemicals basic to progress and industry.*

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# What WHO Is, What It Does

**U. N.'s World Health Organization fights malaria and builds safe water supplies on a global scale. Its biggest problem: personnel**

IN THE SIX SHORT YEARS since its founding, WHO—the United Nations' World Health Organization—has established itself as an agency strongly in favor of environmental sanitation and potentially influential in expanding world construction markets. It is an agency that means something to you if you are a sanitary engineer, constructor or consultant.

Problems of public health and economic development are inseparable. What WHO is doing today is a natural complement to worldwide technical assistance programs also underway (McG-H Digest, Aug '51, p19).

Take malaria, for example. It is not the typical example; it is an extreme, probably the most prevalent serious illness of man.

Here are some figures from C. E. A. Winslow's "The Cost of Sickness and the Price of Health", a 1951 WHO paper.

- In Thailand, malaria case-rates dropped from 50 to 7 per 1,000 in one year of work by WHO.
- On Africa's island of Mauritius, the almost complete elimination of Anopheles funestus cost only slightly more than 40¢ per capita—and halved the death rate.
- In Sardinia, 1,000,000 Italians from the crowded mainland are being settled where malaria has been virtually erased as a barrier to economic development.
- In Ceylon, since introduction of DDT in 1947—for the first time in Asia—the national death rate has been cut almost in two at a cost of 22¢ per capita.
- In Pakistan, a WHO team put on a single-season demonstration in malaria control that has been credited with raising the rice crop yield 15%.

But phenomenal successes against malaria are shadowed by the job still to be done. The world has an estimated 300 to 350 million incapacitated by malaria each year. There are still places where 80% of the population is stricken during the summer season—when their productive energies are most needed.

Malaria is not the only sapper of human energy to stymie economical development. Cholera, typhoid and forms of dysentery will abound until pure water can be supplied and waste waters handled.

One of the world's biggest engineer-

**ICE CATCHER**

**These unusual devices fitted on the side of Northrop F-89 Scorpion's nose help company's engineers study icing under various flight conditions. Actuated while in flight, the cylinders rotate slowly for 30-40 sec. to collect icing samples, are then withdrawn into a refrigeration chamber in the nose. Rate of icing is later determined in Northrop's laboratory.—Aviation Wk, June 23, p58**

ing jobs still remains the supply of safe public water supplies where they do not now exist. Generally, water and mosquitos are number 1 and 2 immediate sanitary engineering problems in areas WHO will help. Sewerage, for the most part, is something for the future.

WHO's international health program is a team operation with the doctor, the nurse, and the engineer playing the key positions. Clinical medicine must be backed by environmental sanitation —good water, food, housing, and sanitation.

WHO operates in the field from six regional offices that blanket the globe. Not only does one of these regions exist without an environmental sanitation adviser, but one vast region of Africa has been administered from Geneva by just four men.

One of the biggest headaches WHO has is that of getting competent people —especially administrators. Sanitary engineers in the organization are at a premium. Among WHO's 79 member nations (and 3 associate members) there are lands that do not have a solitary sanitary engineer even on the national level.

WHO and the other agencies in the business of international health have evidence that a pretty full program against preventable diseases can be carried out for $2.50 per capita per year. But it takes people as well as money.—Eng News-Rec, July 31, p50

## Single Oil System

Chrysler Corp.'s new simplified fluid-torque drive for automobiles combines the oil system of the torque converter with that of the engine. Set up eliminates torque-converter oil pump and oil sump. Combined system needs 13 quarts of oil. Oil-change interval is now 6 mo. Oil filter is replaced every 500 mi.—Auto Ind, Aug 15, p46

***ALUMINUM-ALLOY** aircraft parts are heated, then formed-quenched in Kirksite dies*

## Form-Die Quenching Shapes Tough Alloys

New forming method—form-die quenching—produces extremely accurate contours in high-strength aluminum alloys at North American Aviation, Inc.

The process combines forming and quenching to eliminate warpage and distortion that normally occur during conventional water quenching.

Also, it allows forming of heavy sheet and plate that previously could not be formed to close limits.

Aircraft parts are heated in a circulating hot-air furnace to a specified temperature and held until evenly heated. Each heated part is transferred quickly (to avoid temperature drop) to a large single-acting hydraulic press with Kirksite (zinc alloy) dies. Transfer is made manually or with a specially designed handling device.

The dies simultaneously form and cool the part by conduction through the relatively cold die surfaces. As dies are large, they remain cool during a production run of thin parts. If parts are thick, the form die may be cooled by circulating water through cored out cavities in the die structure.—Am Mach, July 7, p125

## How To Check Poor Lighting and Cut Lamp Replacement

If you are wondering why your lighting system is inefficient, first check these points, which can account for up to 70% loss in available illumination.

1. **Lamp aging**—depending on type of light source and lamp quality.

2. **Low voltage**—depending on service voltage, circuit resistance, and load.

3. **Luminaire inefficiency**—depending on arrangement and shape of parts.

4. **Condition of room surface.** Walls, ceiling, floor, machines, and all other surfaces absorb some light. As they get dirtier, light loss increases.

5. **Dirt, dust, and smoke.** Check processes, ventilation, cleaning schedule.

6. **Lamp outages.** Review replacement schedule, number of hours lamp is burned, and abnormal operating conditions.

If lamp replacement is high, it can be reduced by installing more switches, using higher wattage lamps operated at reduced voltage (125-volt lamps on 115-volt circuits), and installing fluorescent lamps.—Elec World, June 30, p79

DOUBLES DRUM STORAGE SPACE

Easier handling and double the storage space are the benefits Westinghouse Electric Corp. gets from special pallets for drums. As drums are unloaded from boxcars they are rolled onto the pallets. Narrow stringers hold them in place. Fork trucks then carry the pallets to the storage area and stack them four high.—Factory, Aug, p109

## Detector Tells Humidity

New moisture detector looks inside sealed packages and even cocooned aircraft. Hydrotector, developed by American Instrument Co., tells whether package seal is good or bad, and whether or not the dessicant used in the package is keeping moisture within safe limits.

The Hydrotector incluudes a sensing element that can be put inside an already sealed package by means of special tools supplied with the kit. To obtain a reading from the sensing element, the kit includes a portable indicator box.

On contact with leads from the sensing element the indicator tells instantly and accurately whether moisture content in the container is within "safe" limits.—Aviation Wk, July 21, p71

## Rotary Unit Strains Hops

New circular hop strainer at C. Schmidt & Son's brewery has improved quality, yield, and sanitation. Its circular housing encloses a rotating table carrying strainer plates.

Hot hop-laden wort flows from the brew kettle to the strainer. A spreader distributes the wort over the entire width of the plate. As the wort drains through the milled screen slots, hops are retained on the table.

Sparging water is sprayed over the hops during their travel. Liquid on the hops continues to drain until they reach a rotating brush that sweeps them into a chute leading to the disposal conveyor. —Food Eng, Aug, p92

# Letter from the Editor

Dear Subscriber:

Every month, proudly we carry at the top of the masthead page the notation, "Member—Audit Bureau of Circulations." Some of you have asked us what the Audit Bureau of Circulations (ABC) stands for and what it means to you, as a reader. We're happy to tell you.

Our membership in ABC supplies an honest measurement of the Digest's paid circulation. Because that is what ABC does—it makes periodic audits of our circulation records. Reports from these audits are available to everyone; they permit the Digest's worth to be judged on the basis of definite standards and values. Over 350 other business magazines have joined in this cooperative venture of circulation measurement.

Establishing these definite circulation standards has had, since 1914 when ABC was founded, far reaching effects on the advertising business as a whole. It has permitted the planning of advertising campaigns to reach specific markets, it has led to greater advertising effectiveness, and in turn it has helped sales, production, employment to rise.

But where do you, the reader, benefit? In this way—by getting the editorial content you are willing to pay for.

A magazine is built around the editorial content. If that editorial content is high in quality, if it gives you the information you want, you read the magazine. You read the magazine because you know it will help you run your business more efficiently and more profitably.

And when that editorial content no longer serves you effectively, you stop paying to read what we have to say. That constant check keeps us aware of your interest, makes the Digest an editorial leader—not a follower.

Our very existence depends on your continued acceptance. We must help and interest you to stay in business. So the subscription fee is the premium you pay to insure yourself against poor editorial content.

The McGraw-Hill Digest is proud to be an ABC member—proud to be recognized as a magazine that first and last considers your needs.

Sincerely yours,

Harry S. Whalen

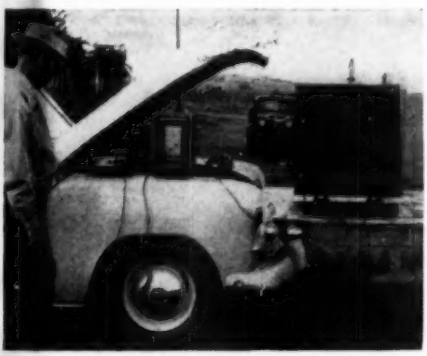
Editor

# NEW EQUIPMENT...

**Film Adhesive**—New adhesive—a yellow film 6 mils thick—changes under heat from a solid to a heavy liquid that flows and binds surfaces together. Temperature for bonding is 300 to 350°F. Film is available in ¼ to 20-in. widths on 36-yd. rolls.—**Minnesota Mining & Mfg. Co.**—Ind Dist, Aug, p124

**Fast Cold-weather Starting**—Device assures quick diesel-engine starts at temperatures down to —65°F. Preheater warms interior of engine; minimizes cranking resistance; augments ignition system; warms lubrication oil.—**Stewart-Warner Corp.**—Eng Min J, Aug, p115

**Dumps to either Side**—New dump-truck bodies mount on standard trailers for side dumping both ways. Used in trains, bodies can handle more than 50 cu. yd. with one tractor.—**Galion Allsteel Body Co.**—Coal Age, Aug, p128



LOCATES PIPE CORROSION

**Photoelectric recorder has simplified locating corrosion in water pipelines for East Bay Municipal Utility District in Calif. Engineers recently made electrolysis surveys over 94 mi. of pipe. Wires from recorder were attached to pipe at manholes. Current drop indicated corrosion. General Electric Co. makes the recorder.—Elec World, July 14, p160**

**Large Thread Grinder**—Style-36 thread grinder can grind single or multiple threads, left- or right-hand, in any pitch from 1 to 128 threads per in. Automatic functions, which speed production grinding, include feed to finished size, wheel dressing, work-size compensation for dressing, resumption of grinding cycle, backlash compensation, coolant control, lubrication, and wheel retractions.—**Ex-Cell-O Corp.**—Am Mach, July 21, p150

**Office Copyer**—Exact copies of office records can be made in less than a minute with Copyfix. Process requires no developing, washing, fixing, or drying. First a negative is made, then a positive.—**Remington Rand Inc.**—Business Wk, Aug 2, p78

**Needs No Curing**—New alkyd-resin dispersion eliminates curing, imparts a hard film to all fibers and retains luster without causing shade change. Most important application is to acetate satins where parchment like hand is desired without mark-off. — **Scher Brothers** — Textile World, Aug, p156

**Supplies Dc.**—Model 50220 constant-current supply provides steady dc. from a-c. line. It is designed primarily for use with potentiometer indicators, recorders, and controllers. Output is 10 ma. at 1.4 v.—**Weston Electrical Instrument Corp.**—Electronics, Aug, p264

**Plastics Molding Presses**—Medium-priced line of low-pressure presses are especially designed for molding reinforced plastics. Platen sizes are 32 by 36 in., 42 by 49 in. and 40 by 76 in.—**Erie Engine Mfg. Co.**—Mod Plastics, Aug, p136

**Radiant Heating Mat**—Rubber mat has built-in radiant heating unit. It is suitable for warehouses, hotels, unheated areas of industrial plants, and wherever workers meet cold working conditions around their feet. Unit needs 110 v.—**U. S. Rubber Co.**—Power, Aug, p160

# . . . AND MATERIALS

### MAGNET LIFTS HOT PARTS

Tube anodes emerging from 1700°F. baking oven at Sylvania Electric Products Inc.'s Emporium plant are picked up and loaded into tote boxes with a permanent magnet. Pulling inner handle moves internal shunt between magnet poles and reduces field strength so parts can drop off. Multifinish Mfg. Co. makes the magnet. — Electronics, Aug, p230

**Oil-tight Pushbuttons** — Dependable operation even under constant oil flooding is assured with oil-tight pushbutton controls. Line includes standard, extended and mushroom buttons, two- and three-position selector switches, and pilots.—**Arrow-Hart & Hegeman Electric Co.**—Iron Age, July 24, p124

**Simple Greasing**—New adaptors fit any grease gun and allow big saving in manhours required to lubricate shielded aircraft bearings. Kit contains three adaptors to cover standard range of shielded bearing sizes.—**E-Z-Lub Mfg. Co.**—Aviation Wk, Aug 18, p56

**Cold Galvanizing** — Galvanite is a compound that galvanizes steel and iron without heating. It is applied by brush, spray gun, or cold dip.—**Galvanite Corp.**—Chem Wk, July 19, p30

**Baking-pan Liner** — Developed to stop sticking of yeast-raised goods, liner 35K-202 also eliminates pan greasing, saves much pan washing, prevents carbonization "black spots" on baked goods. Size is 16⅜ x 24⅜ in.—**Sherman Paper Products Corp.**—Food Eng, Aug, p129

**Stainless-steel Coupling**—Fitting known as Quikupl reduces assembly costs by using light-wall stainless-steel tubing. It is tightened to tube or pipe by setscrew. Assembly is fast and cheap. Wide range of fittings are available.—**Cooper Alloy Foundry Co.**—Prod Eng, Aug, p202

**Low-lift Fork Truck**—Driver-led Moto-Truc has 8,000-lb. capacity and maximum lift of 14 in. Fork length is 8 ft. Truck is battery powered.—**Moto-Truc Co.**—Factory, Aug, p190

**Low-pressure Spraying**—New spray gun can operate at air pressures as low as 40 lb. per sq. in. This cuts power costs by 50% and saves up to 35% in materials by reducing overspray. More uniform, higher-quality coating is claimed.—**DeVilbiss Co.**—Ceramic Ind, Aug, p124

**Locates Engine Trouble**—Portable electronic instrument locates sources of trouble in engines and other moving mechanisms. Instrument has a metal probe that serves as a microphone to locate exact source of tell-tale noise.—**Anco Instrument Div.**—Bus Trans, Aug, p120

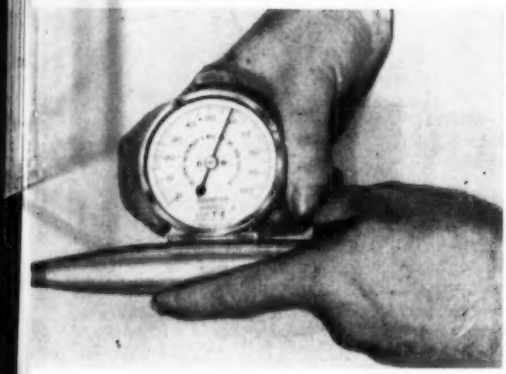
# NEW EQUIPMENT (Cont.)

**Acrylic Monomer**—Acrylamide is crystalline product with easily gained polymerization and copolymerization. Potential uses include preparation of adhesives, dispersing agents, thickening agents, surface coatings, synthetic leathers and rubbers, and finishing agents for paper and textiles.—**American Cyanamid Co.**—Chem Eng, July, p249

**Device Analyzes Welding**—Model B1-213 welding analyzer records variables of a-c. resistance welding machines. It records current and electrode force to show squeeze, weld, hold and off intervals. Quick information permits immediate machine adjustments to be made.—**Brush Development Co.**—Weld Eng, Aug, p56

**Aid to Plastics Fabricators**—New, complete package unit is designed for plastics pipe extrusion. Package consists of extruder, dies, cooling unit, pulling mechanism, and either manual or automatic cut-off saws. Unit produces pipe up to 6-in. diameter.—**F. J. Stokes Machine Co.**—Business Wk, Aug 16, p75

**Wood Grapple**—All-steel welded grapple is designed for loading pulpwood and similar materials with 5-ton crane. Grapple is rated at ¼-cord capacity (100-in. wood); tong opening is 5 ft. 3 in.—**Schield Bantam Co.**—Paper Ind, June, p399



**Cleans Cooling Systems**—Rotary-flow mixing chamber of cooling system cleaner can be attached to filler neck of any truck or car, without removing thermostats or hoses—and it can be left to operate unattended. Special chemical circulates through entire system. If temperature goes above 190°F., motor automatically shuts off.—**Trippe Mfg. Co.**—Fleet Owner, Aug, p79

**Mixer Moves Indoors**—Model 3-P tilting plaster-mortar mixer has 3 to 4-cu. ft. capacity and its 29-in. width clears even narrow doorways for work indoors. Charging is easier. A 3-hp. air-cooled engine supplies power.—**Kwik-Mix Co.**—Eng News-Rec, July 31, p102

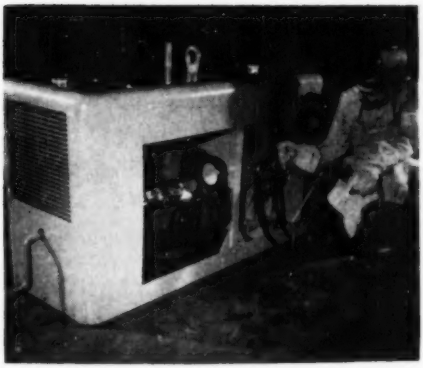
**Hand Pump**—Industrial hand pump handles wide variety of liquids. Pump handles acetates, alcohols, glycols, ketones, ethers, petroleum solvents, ammonia, ammonimum hydroxide, and creosote. Special finish prevents corrosion.—**Tokheim Oil Tank & Pump Co.**—Ind Dist, July, p180

**Pumps Liquid Metals**—A-c. pump with no moving parts handles liquid metals and other low-resistance conducting fluids at temperatures up to 1000° F. Operation is by magnetic force produced by high current set up in the fluid. Capacity is 28 gal. per min. at 20 lb. per sq. in.—**General Electric Co.**—Elec World, July 28, p135

**Power-driven Strapper**—Machine spot welds joints and eliminates all operations requiring physical effort. Unskilled operators can strap packages at high volumes and maintain uniform strap tension.—**Acme Steel Co.**—Mod Packaging, July, p150

### NEW WINDING-DENSITY GAUGE

**Precision testing instrument made by Shore Instrument & Mfg. Co., Inc., measures density of yarn wound on individual cones, spools, bobbins, cops, and package-dyeing tubes. When pressed firmly against a test sample, a blunt pin is forced back into the instrument in ratio to the density of the winding.—Textile World, Aug, p148**



WELDER IS ENGINE-DRIVEN

New welder, model EW-20, supplies both welding current and 110-v., 60-c. single-phase power. Rating is 200 amp. at 40 v. and 60% duty cycle. During welding, 300 w. are available for lighting. In off-welding periods, unit supplies 3 kw. at 100% power factor or 2 kva. at 80% p.f. Four-cylinder Ford engine drives generator. Westinghouse Electric Corp. makes the unit.—Weld Eng, Aug, p54

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**Machine Coils Wire**—New machine coils wire of different sizes—No. 20 to 36 B&S gage—with maximum uniformity. Photocell actuates cutting knife to control lengths accurately. Machine handles full range of resistance-wire coiling normally required.—**Driver-Harris Co.**—Elec West, June, p50

**Unit Dispenses LPG**—Liquefied petroleum gas is dispensed and metered by unit design to increase efficiency of tank-truck operations. It is two-piston, reciprocating-type meter with flow range of 5 to 30 gal. per min.—**Rockwell Mfg. Co.**—Oil & Gas J, July 21, p117

**Straightens Tubes**—Model AN rotary tube straightener handles steel tubing from ½- to 1¾-in. OD and brass, copper, and other nonferrous thin-wall tubing to 3-in. OD. Production speeds range from 40 to 400 ft. per min. Machine weighs 11,500 lb.—**Mackintosh-Hemphill Co.**—Power, Aug, p156

**Industrial Reflectors** — All-white porcelain-enamel fluorescent reflectors give 10% upward light component. Open-end reflectors are available for two or three 75-w. slimline lamp. Both open-end and closed-end reflectors are available for two or three 40-w. and two 85-w. lamps.—**Day-Brite Lighting, Inc.** — Elec C&M, Aug, p102

**Streamlined Scales**—"Speedweigh" over-under scales offers advanced design for speed and accuracy in industrial packaging and check-weighing. Three capacities are available: 5 lb., 20 lb., and 50 lb.—**Toledo Scale Co.**—Textile World, Aug, p154

**Gasoline - powered Saw** — Radial - arm saw powered by gasoline engine can be used in areas not served with electric power. Tool takes 10-in. blade and cuts 3⅞ in. deep with 15-in. travel. It will miter, bevel, or compound miter.—**R. W. Hendrick Co.**—Am Builder, Aug, p168

**Sodium Marbles**—Adding metallic sodium to chemical reaction zones is made easier with sodium spheres (0.5 to 1 in. in dia) covered with film of hydrocarbon oil or soda ash. Coating reduces handling hazard.—**Humphrey-Wilkinson, Inc.** — Chem Wk, Aug 2, p50

**Surface Pyrometers**—Fourteen types of thermocouples and rigid or flexible extension arms are available on Pyro surface pyrometers. Models 30 to 34 cover ranges from 0-300°F. to 0-1200°F. Thermocouples are also designed for subsurface measurements in plastics, rubber, semifluids.—**Pyrometer Instrument Co., Inc.**—Nucleonics, Aug, p84

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## *READER SERVICE*

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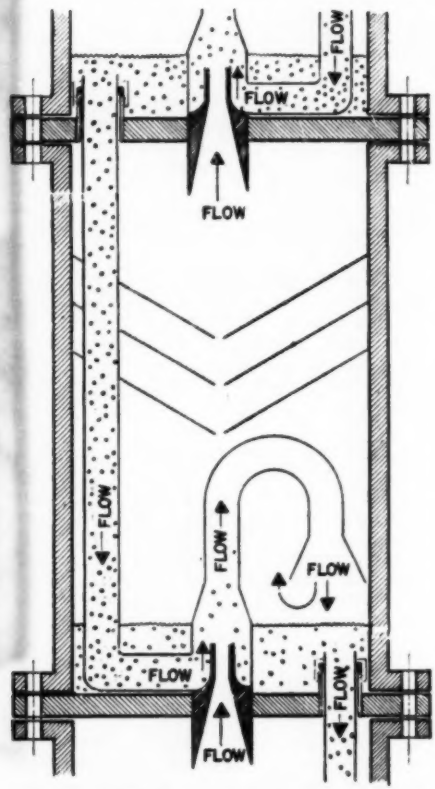
# Distillation-Column Design

- **New type of distillation, absorption, and extraction column is based on the well known principles of fluid dynamics**
- **The column, called a jet contactor, provides intimate mixing of liquid and vapor on trays in separation-process columns**
- **Advantages include increased operating capacity for given diameter, smaller plate spacing, higher mass transfer rate**




***JET CONTACTOR** throttles continuous phase to a jet and gives it enough velocity pressure to carry itself and the discontinuous phase through U-shaped tube*

UTILIZING the principles of fluid dynamics, M. R. Cannon, a consulting engineer, has designed a distillation column to take advantage of those principles.

The unique and fundamental difference between static pressure and velocity pressure has been exploited in the design. This difference is that static pressure is equal in all directions, whereas velocity pressure exists only in the direction of flow. Furthermore, an increase in velocity pressure is accompanied by a decrease in static pressure.

Here is how the jet contactor works: A jet of high-velocity vapor carries the liquid through a U-shaped tube, which directs mixture of liquid and vapor down toward the bottom plate—the direction desired for the liquid droplets. The phases, while in the tube, are in a high degree of turbulence that increases the rate of mass transfer between the phases and the destruction of any localized equilibrium areas that may occur.

The vapor flows upward through the three entrainment separators, which may be porous media or screens. The vapor stream flows on upward and is throttled through the next plate by another venturi-like tube. The liquid flows downward through the tube at the left side of the column into the throttled vapor stream on the plate below.

Advantages claimed for this design over present equipment are:

1. Maximum operating capacity for a given diameter is increased considerably.

2. Plate spacing can be smaller than in conventional columns because gravity flow of liquid from plate to plate is not essential.

3. High turbulence and shear rates in the U-shaped tube increase the mass transfer rate between phases.

4. Presence of a liquid gradient head across the plate causes no trouble in the operation.

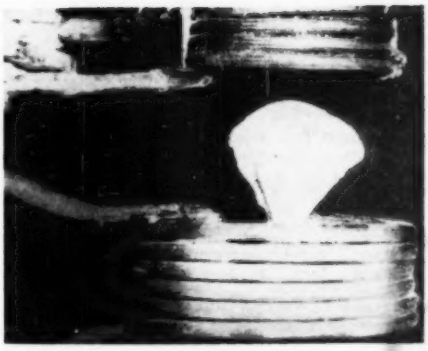
5. For a given capacity, column height and diameter are less than with a conventional column; foundations are smaller, simpler, less costly.

6. The two phases cannot bypass each other; column design insures intimate, turbulent contact.

Application of this design in liquid-liquid extraction will be excellent because the turbulent stirring in the U-shaped tube is even more important in liquid extraction than in distillation or absorption. Where the continuous liquid phase is of lower density than the discontinuous liquid phase, the continuous phase would enter at the bottom as shown.

If the continuous phase were of higher density than the discontinuous phase, the plates would be reversed and outlet tubes would point upward instead of downward. The continuous phase would be pumped into the top.

Modifications of the design may be desirable for specific purposes. If temperature control is important, a coil with a circulating heat-transfer medium may be inserted in the discontinuous phase on the lower plate. Inlet and outlet ends can be taken through column walls or the plate itself. Temperature can also be controlled by jacketing column, tube, or both with a circulating heat-transfer medium.—Oil & Gas J, July 28, p268



***TOP-LIKE SHAPE** was a round ball of metal that has been melted by magnetic field*

## Melting Metals in Space

Major trouble in producing pure high-temperature metals is that while impurities boil off during melting, others are picked up from the crucible.

The unique solution worked out by Westinghouse Electric Corp. is to melt the metal without its being in contact with anything. Melting in space, or levitation melting, suspends the metal by an electromagnetic field produced by coils surrounding but not touching the melt.

The induction coils also provide heat for melting and cause induction stirring. As current is applied, the metal rotates and melts. Then, depending on the kind of metal and whether it is being melted in air or a vacuum, the molten metal will stay supported between the coils or drain downward. Floating of the metal appears also to depend somewhat on surface tension and on the presence of an oxide film when such film forms.

Further development may permit resolidification of a metal before dropping it into a crucible. Another possible use for the method, other than purification, is melting for alloying.—Iron Age, July 31, p83

## Basic Requirements for Quality-Control Laboratory

The following testing setup should be adequate for medium-size sheeting mill (30,000 to 50,000 spindles).

Minimum area is 500 sq. ft., and it should be air conditioned. Plenty of electric outlets should be available. The lab will also need compressed air at 70 lb. per sq. in.

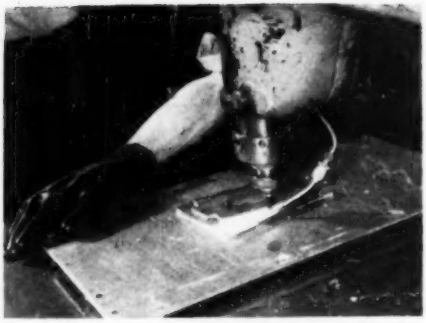
Minimum equipment would be: a Pressley fiber tester; a precision balance (3-mg. capacity); a Micronaire (fineness tester); a Fibrograph (optional); an Aerolometer (optional); a roving reel (1 yd.); a 1½-yd. yarn reel; a yarn-numbering quadrant; a Model-J skein tester; a twist counter; an evenness tester; two grain scales; a lap meter; a single-end tester (optional); and a moisture oven.

The laboratory will also need a hand tachometer, a tensiometer, and a moisture register. Office equipment—such as a calculator, adding machine, typewriter, slide rule—should be included. An experimental roving frame and spinning frame are desirable. A small chemical bench for simple analysis should be available.—Textile World, July, p234

## Insulating Papers Developed

Quartz paper and ceramic paper, both with superior electrical insulation properties, are made by the U. S. Navy, for its own use, from cheap raw materials. Quartz paper withstands temperatures to 3000°F. while ceramic paper withstands 2500°F.

Quartz paper is made from high-silicon or quartz fibers. All ingredients except silica are leached out with acid. Pulp is neutralized, dried, mixed with water in a beater, and pumped to a conventional Fourdrinier paper-making machine.—Chem Eng, July, p248



**$CO_2$ COOLS ROUTER BIT**

**Titanium sheet-metal parts have been successfully fabricated at North American Aviation, Inc. Odd-contoured blanks were cut by routing. The 3/16-in., five-fluted router bit was cooled by carbon dioxide fed from a fire extinguisher through a copper tube and 0.013-in.-dia. nozzle. Router cut 0.030-in. RC-130A alloy at 15 in. per min.—Iron Age, July 17, p132**

## Electronic Clerks Nearer?

Electronic computers can solve extremely complicated mathematical problems, but they have yet to prove their worth in business offices in all but the most special cases. Many companies, however, are at work developing tube devices for doing clerical work.

Electronic Computer Corp. has nearly completed a 1,000-tube machine to service a weekly magazine circulation list. It will print 750,000 mailing labels and make 20,000 corrections in stored information each week.

Potter Instrument Co. will soon have a new random-access memory device. In conjunction with Potters "flying typewriter" (McG-H Digest, May, p48) and a new input keyboard, the device will provide a completely automatic electronic business machine.

Most research is directed toward improved memory and input-output devices.—Electronics, Aug, p8

## New Solid Fuel May Invade Present Canned-Heat Market

Newest member of the constant growing petrochemical family is trioxane, a solid fuel. First use will be to heat soldiers' field rations.

Celanese Corp. of America is making trioxane in a new $3½-million plant that will turn out 25-million lb. of paraformaldehyde—half of it for trioxane. Controlled oxidation of butanes and propane produces the basic chemical along with other oxygenated chemicals. It is separated from the other chemicals in a dilute water solution.

Conversion of liquid paraformaldehyde to trioxane involves catalytic cyclization and dehydrogenation. Result is the white crystalline trioxane, which burns with a non-luminous blue flame, leaving no ash.

Possible civilian uses include "canned heat". It may develop a substantial outlet to sportsmen and chafing-dish hostesses. Its low ignition point may make it suitable for heating engines and equipment in arctic service.—Oil & Gas J, July 21, p42

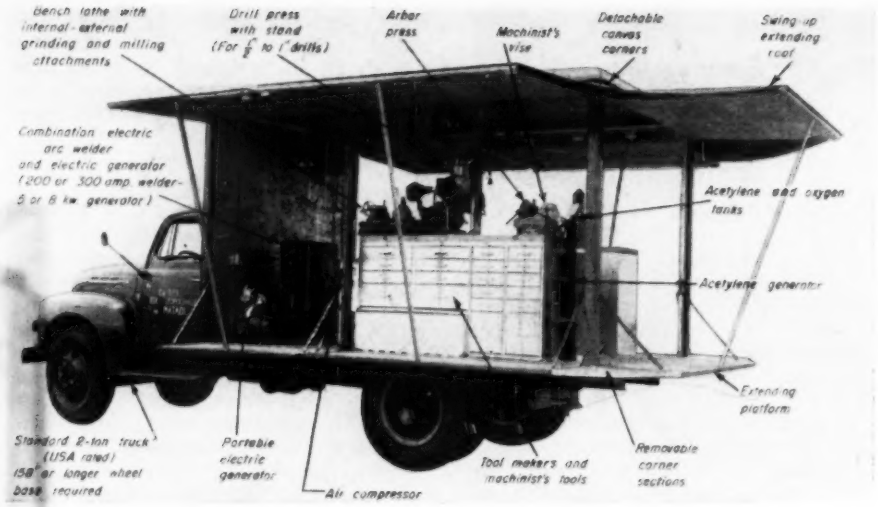
## Antihistamines Slip

Sales of antihistamines, which boomed in 1949 as cold remedies, have fallen sharply, both last year and so far this year. Large numbers of the buying public, whether misled by sensational advertising or having colds that did not respond to antihistamines, have gone back to their old remedies.

But at the same time, sales from doctors' prescriptions have climbed. Antihistamines are being prescribed increasingly for allergies. And topical applications for poison ivy, oak, and primrose are in wide usage.—Chem Wk, July 26, p14

### PUMP TRUCK DELIVERS FLOUR

Atkinson Milling Co. has come up with a special flour hauling tractor-trailer. It can be filled with flour; contains all power equipment necessary to pump flour right into the baker's storage bin. The trailer can hold 40,000 lb. of flour. It is loaded by an ordinary gravity feed system. Inside of trailer has a sloping bottom that slides flour to a pressurized chamber. When trailer unloads, pumps blow flour out pressure chamber, through a 3-in. hose, and into the baker's bin.—Business Wk, Aug 9, p62


Bench lathe with internal-external grinding and milling attachments
Drill press with stand (For ¼ to 1" drills)
Arbor press
Machinist's vise
Detachable canvas corners
Swing-up extending roof
Combination electric arc welder and electric generator (200 or 300 amp. welder-5 or 8 kw. generator)
Acetylene and oxygen tanks
Acetylene generator
Extending platform
Standard 2-ton truck (USA rated) 158" or longer wheel base required
Portable electric generator
Air compressor
Tool makers and machinist's tools
Removable corner sections

MOBILE MACHINE SHOP IS "TRAVELING TROUBLESHOOTER"

**When Cemco Industries Inc. set out to design its traveling machine shops, it had three prime requirements in mind: (1) the rig must be complete, (2) it must have everything conveniently arranged and compact, and (3) only recognized, quality equipment could be accommodated. Now it is available and can be mounted on any standard 2-ton truck or in a trailer or van-type vehicle. Its generator is removable for use anywhere. Power can be supplied for a stationary generator, arc welder or similar piece of equipment by a power takeoff.—Eng News-Record, Aug 21, p112**

## Mechanize the Small Mine

**Basic** considerations for mechanizing an old or new mine for 300 to 600 tons per day are:

1. Production should be steady every day.
2. A large stock of spare parts is necessary to keep one loader going steadily.
3. Cost of equipment prohibits carrying standby machines.
4. Small-tonnage mines can and usually do have better labor.
5. Small-tonnage mines can have better supervision.
6. All coal should be produced on one shift.

The best system would be full conveyor from the face to the tipple. Also, production should come from several room and heading faces and should be loaded by several small-capacity machines.—Coal Age, Aug, p106

## Form-Fit Armored Shipper

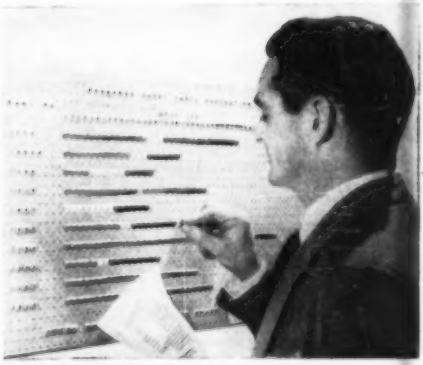
A two-layer form-fit container cradles delicate magnet wire in shipment. The container has an outer shell impregnated with high-solids phenolic-resin solution to supply impact-resisting qualities and a softer pulp liner without impregnation to supply shock-absorbing qualities.

Anaconda Wire & Cable Co. ships up to 80 lb. of wire in the container.—Mod Packaging, July, p104

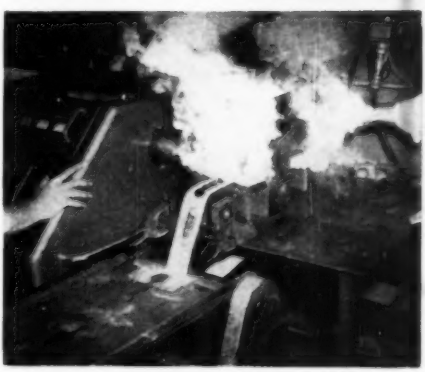
# This Month's How To . . .

**. . . nail wood templets** to concrete footings and floors is speeded up with a cartridge-powered tool. The templet, made of four pieces of lumber set to chalk lines, acts as a yoke to hold bottom of column form in exact position. Two opposite pieces of the yoke are fastened to the concrete with two tool-driven studs each. The remaining two pieces are simply nailed to these. Entire operation takes one man 5 min. Previous method of driving nails took 1 hr. Remington Arms Co. Inc., makes tool.—Const Meth & Equip, Aug, p61

**. . . keep track** of a wide variety of business operations is easy with a new colored status board. Basic unit of the Victor Controla-Chart, made by Victor Safe & Equipment Co., is a 15 in. by 30-in. enameled board. The board may be joined to others to accommodate any size record. Colored and printed clip-on signals, name tubes, and sliding indicators can be kept up to date with only a few minutes attention each day. Colors show different factors on chart. The board is suitable for display in the front office or conference room.—Business Wk, Aug 16, p75



**. . . preheat plastic preforms** with microwaves is the problem being studied at General Electric Co. with this experimental 915-mc. magnetron oscillator. (The magnetron is essentially a diode.) Preform is placed at cavity center where magnetic field is high and uniform. It is preheated in 1 sec. to a molding temperature of 190°C. Preforms are fed through the resonant cavity on an endless belt, emerging at molding temperature. Quarter-wave chokes reduce radiation through the entrance and exit holes in the cavity.—Electronics, Aug, p104



### Convention Calendar

### (Equipment Exhibited)

Nov. 6-8—American Association of Textile Chemists and Colorists, Boston, Mass.

Nov. 12-15—Paint and Wallpaper Exhibit and Convention, Chicago, Ill.

Nov. 30-Dec. 5 — Exposition of Power & Mechanical Engineering, New York, N. Y.

Jan. 19-22 — Plant Maintenance Show, Cleveland, Ohio.

Jan. 25-28—National Sporting Goods Show and Convention, New York, N. Y.

Feb. 25-28—National Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.

May 18-22—Fifth National Materials Handling Conference, Philadelphia, Pa.

If you are interested in any of these expositions, either as a possible equipment exhibitor or as a visitor, the McGraw-Hill Digest will be glad to furnish additional information.

## Really Scuffproof Labels

ReaLemon-Puritan Co. contrasts a bright lemon-yellow color against a solid-black background for its lemon-juice container label. But one problem was this: the black background was easily scuffed and the labels often obliterated. So ReaLemon tried coating the label with a baked-on acetate finish. Results showed no scuffing. Additional benefits included fast labeling production; fewer shutdowns on the labeling equipment. Cost is slightly higher.—Mod Packaging, July, p98

## Welded Reinforcement Erected Before Forms

T. C. Jones & Co., Ltd., London, shop-welds "beams" and "columns" of reinforcing bars and erects them as a self-supporting frame before any forms are built.

Advantages include: (1) radical reduction of site labor for placing reinforcement, (2) reduction in overall construction time at the site, (3) more freedom in tamping the concrete because there are no transverse stirrups, and (4) no overlapping of carpenters and iron workers or masons.

All hooked bars are eliminated. As are bentup bars and transverse stirrups. Diagonal bars welded to top and bottom bars provide adequate shear resistance. Columns are fabricated by welding a continuous helical wire to the main bars. Columns are fitted with end plates welded to the main bars that support the beam units. Special clips secure beams and columns (of reinforcement) firmly to each other.—Eng News-Rec, Aug 7, p68

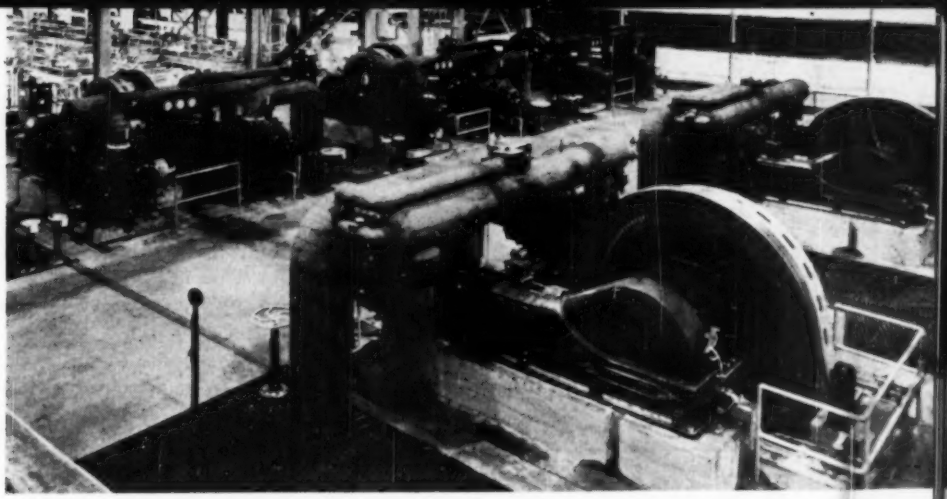
## How Safe Is Kerosene?

Some oilmen tag kerosene as a "safe" fuel when comparing it to high octane aviation gas. That is not true. The difference between the two is that kerosene simply has its own special group of hazards. Some dangerous characteristics are:

1. With a wider boiling point, kerosene is more dangerous in hot weather and is more apt than gasoline to give off flammable or explosive vapors.

2. Being a heavier fuel and causing more friction in flowing, kerosene presents greater problems of removing static electricity.

Kerosene generally demands more careful handling in refueling operations.—Aviation Wk, July 28, p31



*FIVE AMMONIA COMPRESSORS in the Sindri Fertilizer Plant help make fertilizer for the farms that feed the people of India. They form part of the Worthington line of products.*

## *In 100 Years*

# The Worthington Story . . .

**. . . has unfolded from an invention of a young engineer. From that invention stemmed an organization that is part of world's industry**

RISING out of an arid plain at Sindri, India, is Asia's largest fertilizer plant. Badly in need of fertilizer for the farms that feed a hungry nation, India looks to Sindri for help in fulfilling an age-old desire for relief from famine.

Sindri's plant turns out 1,000 tons of fertilizer daily. Translated into food, that means 875,000 tons more of grain each year. And Sindri's plant is just the nucleus of a growing industrial center that will transform the arid plain into a modern addition to India's new industrialization. Chemical by-products of the fertilizer plant will serve as raw materials for other plants. A new power plant assures plenty of power for incoming industry.

The joint aid of U. S. and British private industry helped build the plant and it is wholly owned by the Indian government. Britain's Imperial Chemical Industries and Power Gas Corp. did the preliminary work. Chemical Construction Corp., a U. S. firm, did a major part of the technical work; it was aided by such firms as the Worthington Corp.

The Worthington Corp. has built one of the world's largest refrigeration plants at Sindri. It cools and circulates the various chemicals to produce synthetic ammonia for making fertilizer. All told, more than 6,250 tons of Worthington refrigeration work in the vast fertilizer factory.

It was no accident that Worthington equipment was chosen for the fertilizer

# WORTHINGTON

Now familiar in all parts of the world as the emblem of Worthington, the Egyptian Winged Disk is one of the oldest symbols in recorded history. To the ancient Egyptians, it symbolized the protection of the Sun-God who was then believed to rule the world. Today it identifies Worthington products and also guarantees Worthington service.

With its adoption in 1885, every Worthington pump carried the emblem. At distant outposts of the world, where civilization was just beginning and where English words meant little, Worthington pumps came to be known by the emblem. The people of those lands called them "Bird" pumps (from the trademark) and when new equipment was bought they specified "Bird-Brand."

plant at Sindri. Since 1840, when young Henry R. Worthington invented the single direct-acting pump, the company has pioneered in many significant basic engineering developments. Its products find their way into the petroleum industry in production, transportation, and refining; into gas and oil pipelines and distribution; into air conditioning and refrigeration in every branch; into steam power, land and marine, including turbines, condensers, feedwater heaters, and auxiliaries.

Its products include diesel and gas engine units covering a wide power range, air and gas compressors for all industrial purposes, a comprehensive line of contractor equipment, and pumping equipment whose scope is wide.

## *A New Pump Leads the Way*

But Worthington did not cover this huge field from the very start. Worthington's story begins with a single direct-acting pump. Its invention revolutionized the practice of water handling. At first, the new pump saw service aboard the early steamships. Further development provided pumps for water works, industry, and early World's Fairs. Soon Worthington became the leading name in pumps.

One-hundred years ago, its name found its way overseas. In 1852, Worthington sold its first pump for overseas installation—a "Worthington" type of pump for King's Cross Station, London, England. Thus the young firm launched itself into the overseas business field.

Progress was slow at first, but in 1884 opportunity to prove superiority of Worthington pumps appeared. A British military force was hemmed in at Khartum, in the Sudan. A relief expedition was organized. But how could it march more than 300 miles across dry desert? Without water, the army could not advance.

The newly-formed Worthington Pumping Engine Co. of London offered its services. It would guarantee water for the troops throughout their march. Twelve of Worthington's high-pressure pumps were rushed to the scene, set up, and successfully supplied the British with all the water they needed.

Out of this incident came immediate recognition of Worthington in England. James Simpson & Co., Ltd., largest pump manufacturer in England,

***FRONT COVER—Says President Ramsey: "Pumps are only a part of Worthington's products". That is the reason behind the name change, early this year, from Worthington Pump & Machinery Corp. to Worthington Corp.***

reached an agreement with Worthington to make the now famous line of "Worthington Pumping Engines". In 1916, the two companies joined, forming Worthington-Simpson, Ltd.

Many products flow off the Worthington-Simpson's production line. In addition to the standard line of steam and centrifugal pumps, the company makes single-stage and multi-stage evaporators, forced-draft and natural-draft steel-shell cooling towers, vertical duplex high-speed single-stage and two-stage reciprocating compressors, and rotary compressors.

Offices and engineering personnel are located in Johannesburg, Sydney, Salisbury, Bulwayo, Singapore, and Madras. Worthington-Simpson also has its own affiliated company in India, with offices in Bombay and Calcutta.

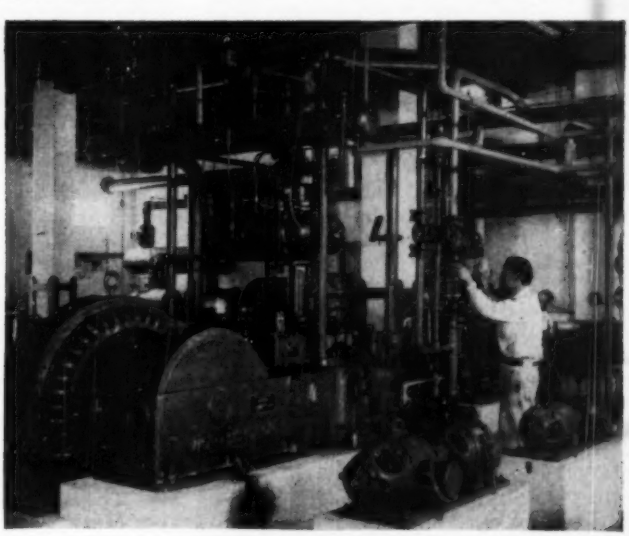
### *Worthington Builds in Europe*

With Worthington's fame firmly established in England, other European countries soon needed plants to meet the demand for Worthington equipment. The German plant was the first to be established.

Worthington began its long career as an important part of German industrial development in 1893. Known as Deutsche Worthington Gesellschaft, M. B. H., it has been an important supplier to oil companies in the rebuilding of German oil-refining facilities. It makes a complete line of marine pumps, general industrial pumps, single-stage and two-stage air compressors, and water purification plants. A new plant in Hamburg is nearly ready to go into production.

In 1895, Worthington offices were opened in Vienna. By 1898, business controlled by this office had grown so large that an Austrian sales and manufacturing unit was formed.

Before World War I, the company gained an excellent reputation in Austria-Hungary for manufacture of water-works pumping engines. The shift in the economic and industrial status of Austria resulting from World War II caused marked changes. But



***FISH-FREEZING PLANT** near Lima, Peru, freezes 40 tons of fish a day for export.*

***FRENCH PLANT, rebuilt in 1945, turns out almost the full line of Worthington products with modern production tools. Output with the new plant has been boosted.***

the company now called Worthington Pumpen and Maschinenbau, G.m.b.H., continues to expand and develop its markets in industrial pumping, irrigation and drainage work, iron, coal and copper mines, and the petroleum industry.

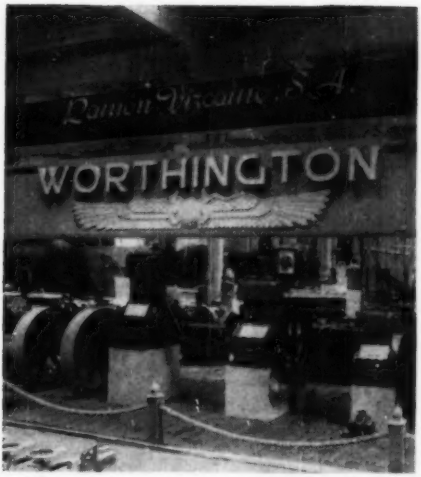
For 46 years, Societe Worthington has been part of the French industrial picture. The present plant is modern and houses the latest in production tools. Among the company's customers have been French refineries, power plants, mines, railways, and chemical plants. Its products include heat exchangers, boiler feed pumps, air compressors, refrigeration machines—as well as the standard line of Worthington pumping machinery and compressors.

Worthington's Spanish company, organized in Barcelona over 45 years ago, is known as Bombas y Construcciones Mecanicas Worthington, S. A. For years, this company has been the major supplier of pumping and compressor equipment to the industry of Spain. It makes a broad line of pumps of all types, compressors, and refrigeration machinery.

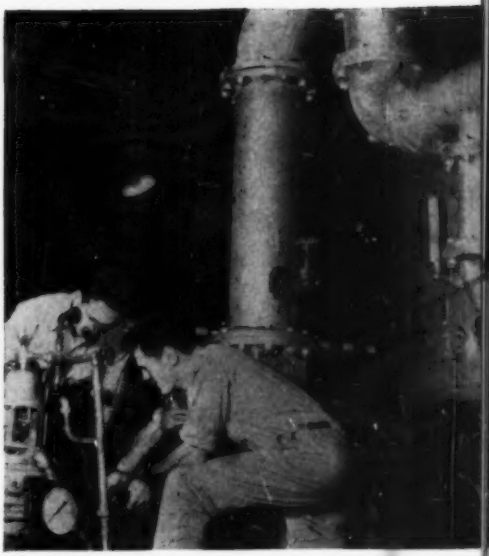
Completely reconstructed in 1940 with up-to-date manufacturing equipment, the shop is situated on the outskirts of Madrid. A new shop keeps up with increased demands in Spain and elsewhere in Europe.

In Italy, Societa Italiana Pompe & Compressori began to manufacture a part of the Worthington industrial machinery line in 1932. A complete new works was built in 1939. Today it handles a wide range of products and has supplied the bulk of pumping machinery for the Italian petroleum industry. It also manufactures deep-well and centrifugal pumps for irrigation, drainage, and water-works service as well as Worthington's standard line of air compressors.

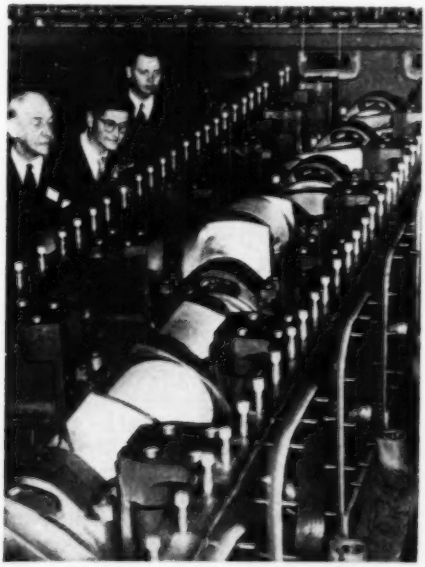
Besides these plants, Worthington has opened new plants in Brazil and Mexico. Representatives, located



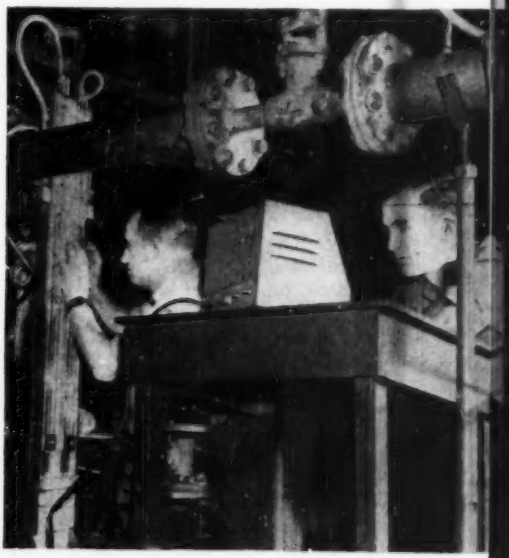

***WORTHINGTON** proudly exhibited at the International Fair in Barcelona, Spain.*

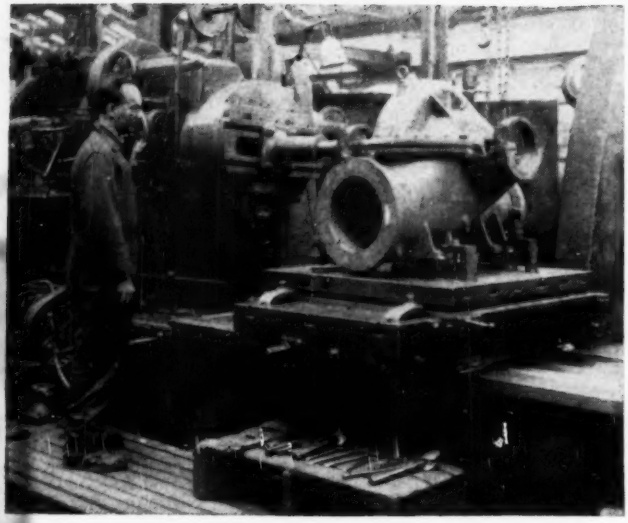


***STUDENTS** from all parts of the world train at Worthington's Harrison, N. J., plant.*



***OIL EXPERTS** from Europe tour Worthington plant to study U. S. production methods.*





***BRITISH PLANT** employs 1,200 people, many of whom are highly skilled. Facilities include foundry, welding shop, plate shop, and test shop.*

throughout the world, stand ready to provide the "know-how" on many engineering problems.

Native personnel, almost without exception, staff Wortington's plants abroad. By paying its workers the highest wage rates possible, Worthington attempts to raise living standards wherever it does business. Besides high wage rates, the company believes in a modern social program for its workers. The program includes social-security benefits, medical plans, allowances for workers whose families increase, and paid vacations.

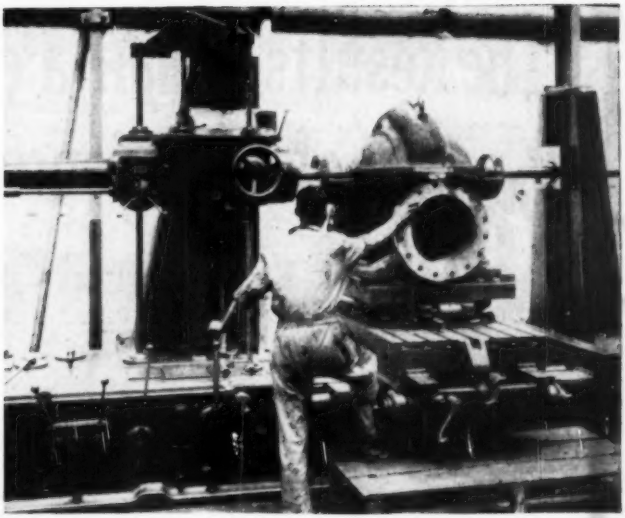
All these have paid off for Worthington. The company has succeeded in attracting highly capable workers. It has found that after a minimum of training and experience its people are as loyal and productive as anywhere in the world.

### *Power of Brazil*

Worthington's influence is felt in many communities throughout the world. Brazil has one of the world's fastest growing populations. A fast-growing population needs power. So Worthington promotes and installs electric-generating stations in the small villages and towns that dot Brazil's map. These stations have helped bring in the industries that provide jobs for people.

In Iran, the tribal economy is traditional. Most of Iran's people are nomads. Through Point Four, Worthington supplies equipment and engineering know-how for strategically placed wells. Now, wandering tribes are assured of an ample water supply. Long-range plans call for these wells to form the nucleus of an irrigation system that may transform the tribal economy to one of agriculture.

Worthington construction equipment is helping to build a road network that will speed Ethiopia's produce to market. Highways are vital to the Ethiopian economy, which depends on the export of coffee, hides, skins, cereals, and edible oils. These are perishable goods and they must be moved quickly from



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remote producing areas to market centers to maintain Africa's third largest independent nation. Worthington is proud of its part in this undertaking.

Three unique installations in Saudi Arabia demonstrate Worthington's engineering ability. Daytime heat reaches 50° C. but in the three main oil-production centers and administrative headquarters—Abqaiq, Ras Tanura and Dhahran—indoor weather is about as comfortable as anywhere in the world. From a central refrigeration system supplied by Worthington, chilled water is pumped through street mains and into every building in the community, including homes, offices, and shops. Individual blowers keep the air at 20 to 25° C.

In these three centers where oil is taken out of the ground and refined by the Arabian-American Oil Co., Worthington has supplied 95% of the central refrigeration system.

An international student-training program promotes world-wide use of Worthington's highly developed engineering and manufacturing skills. Each year a group of qualified students from all over the world is selected for enrollment in Worthington's training program. Courses include visits and planned technical programs at various U. S. plants.

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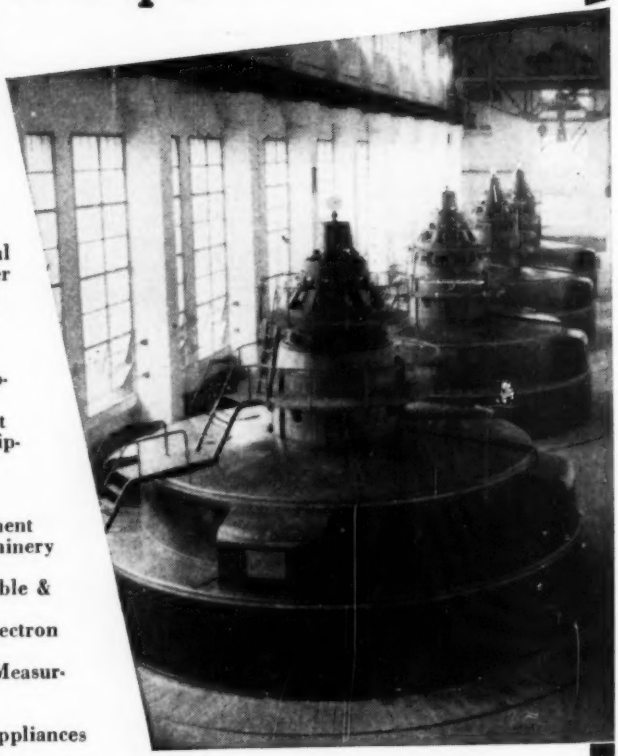

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# PRODUCTION IDEAS

## from Manufacturers' Catalogs

**10-1 Cylindrical Grinders**—Landis Tool Co. 16p. Catalog J-52 illustrates and gives specifications of 14- and 18-in. Type C universal precision grinders.

**10-2 Casters and Trucks**—Rapids-Standard Co., Inc. 36p. Catalog CT-52 covers Rapistan casters and trucks, including several new lines.

**10-3 Foundry Equipment**—Jeffrey Mfg. Co. 70p. Catalog 845 contains many illustrations of foundry systems and equipment.

**10-4 Stainless-steel Fastenings**—Star Stainless Screw Co. 20p. Specifications for all types of stainless-steel fastenings are given in Catalog 52-A.

**10-5 Coating Resins**—Libbey-Owens-Ford Glass Co. 12p. Two folders list characteristics of Plaskon resin glues and Plaskon coating resins.

**10-6 Monogas Generator**—Westinghouse Electric International Co. 8p. Applications, construction details, and dimensions of the packaged Monogas generators are given in bulletin DB-28-825.

**10-7 Welding Directory**—Eutectic Welding Alloys Corp. 16p. "1952 Directory" of electrodes and welding alloys contains photographs, data, and technical information.

**10-8 Handling Costs Cut**—Towmotor Corp. 16p. "Handling Materials Illustrated" Vol. 10, Nos 1 and No. 2, tell the story of cutting costs with fork lift trucks.

**10-9 Mechanical Tubing**—Babcock & Wilcox Co. 8p. Bulletin TB-340 covers hot-finished, cold-drawn tubing. Bulletin TB-339, covers cold-drawn seamless carbon steel tubing.

**10-10 Spray Nozzles**—Link-Belt Co. 4p. Information on non-clogging spray nozzles for cleaning screens, fruits, and vegetables is given in folder No. 2386.

**10-11 Formica**—Formica Co. 16p. Third Quarter 1952 issue of Formica World pictures the use of formica in many industries.

**10-12 Servomechanism Techniques**—Minneapolis-Honeywell Regulator Co. 24p. Information on new approach to analysis of automatic control problems in industrial process instrumentation is given in booklet G-56.

**10-13 Pipe Support**—Bergen Pipesupport Corp. 6p. Catalog 511 gives size selection table and specification data on constant-support pipe hangers.

**10-14 Canada**—Bank of Montreal. 100p. "Canada Today" pictures the story of the country, the people, the resources, and the opportunities for businessmen.

**10-15 Wood Finishes**—Monsanto Chemical Co. 16p. "How To Create the Finest Wood Finishes" tells how to use "Rez" synthetic resin sealer products.

**10-16 Potentiometers**—Bristol Co. 36p. Dynamaster electronic potentiometers and bridge instruments for industrial use are described in bulletin P1245.

**10-17 Ratio Totalizer**—Hagan Corp. 8p. The Hagan Ratio Totalizer, pneumatically operated control mechanism for combining input control pressures and spring forces, is described in bulletin 5452.

**10-18 Folding Cartons**—Robert Gair Co., Inc. 28p. "Style Guide" details construction designs for folding cartons.

**10-19 Construction Report**—Business Week. 8p. "Contractors are Big Customers" is an informative research report on construction contractors in the U. S.

**10-20 Dresinate**—Hercules Powder Co. 12p. Technical booklet describes properties and applications of "Dresinate"—a series of sodium and potassium salts of rosins and resins.

**10-21 Die-casting Lubricants**—E. F. Houghton & Co. 4p. Recommendations for dilutions and applications of four lubricants are found in "Houghton's Die Casting Lubricants".

**10-22 Tool Steels**—Universal-Cyclops Steel Corp. 8p. "Tool Steels for the Fastener Industry" describes seven tool steels.

**10-23 Metallic Packings**—Raybestos-Manhattan, Inc. 8p. Descriptions, service rec-

# PRODUCTION IDEAS (Cont.)

ommendations, and illustrations of R/M Flexible Metallic Packings are given in bulletin of that name.

**10-24 Microscopical Dyeing**—American Cyanamid Co., Calco Chemical Div. 22p. Calco Technical Bulletin 825 deals with visual and photographic observations made with the Microdyeoscope.

**10-25 Chemical Proportioning** — % Proportioneers, Inc.% 58p. Bulletin CAT lists all Proportioneer's bulletins on their equipment.

**10-26 Flow Meter**—Fischer & Porter Co. 12p. Catalog 40 discusses Armored Flowrator Meters for high-temperature and high-pressure use.

**10-27 Transmissions**—Fuller Manufacturing Co. 8p. Specifications on line of heavy-duty transmissions and auxiliaries are given in Condensed Specifications Folder.

**10-28 Finishing Plastics**—American Wheelabrator & Equipment Corp. 4p. Bulletin 674 covers the use of the Airless Wheelabrator in the mechanical finishing of plastics.

**10-29 Surface-active Agent**—Airco Co. International. 12p. Sharples Report 49-2 describes applications and physical properties of Nonic 218, a synthetic surface-active agent.

**10-30 Radioactive Cutting Tools**—Cincinnati Milling Machine Co. 16p. New method using radioactive isotopes as tracers to measure tool wear is told in "Radioactive Cutting Tools for Rapid Tool Life Testing".

**10-31 Belting**—International B. F. Goodrich Co. 12p. Bulletins 2100, 2200, and 2-7902-G1 cover transmission belting, conveyor and elevator belts, and turnover conveyor belts.

**10-32 Controllable Capacity Pumps**—Aldrich Pump Co. 8p. Applications, features, design, and operations of Aldrich-Groff "Powr-Savr" controllable capacity pumps are covered in data sheet 65A.

**10-33 Materials Handling** — Clark Equipment Co. 20p. Vol. 10, No. 2 of Materials Handling News pictures the use of fork-lift trucks and attachments.

**10-34 Chemical News**—Witco Chemical Co. 12p. Spring-Summer 1952 issue of Witcombings has notes on items of interest to the chemical industry.

**10-35 Precision Instruments** — Associated Research Inc. 8p. Bulletin 10A describes electrical testing instruments, tachometers, current transformers, volt-ammeters.

**10-36 Oil-well Hook-ups**—Baker Oil Tools, Inc. 8p. Foldout features the Baker-Otis Selectrive Dual-Zone Production Hook-Up.

**10-37 Addressing Office Mail**—Elliott Addressing Machine Co. Foldout illustrates various types of mail addressing machines.

**10-38 Production Case Study** — National Automatic Tool Co. Inc. 8p. The use of six Natco drilling, boring, facing and tapping machines in the production of dictating machines is told in Success Story No. 7.

**10-39 Industrial Chilling Equipment**—Deep-freeze Distributing Corp. 9p. Catalog 101 and catalog sheet W-120-H show Sub-Zero Products' industrial chilling equipment.

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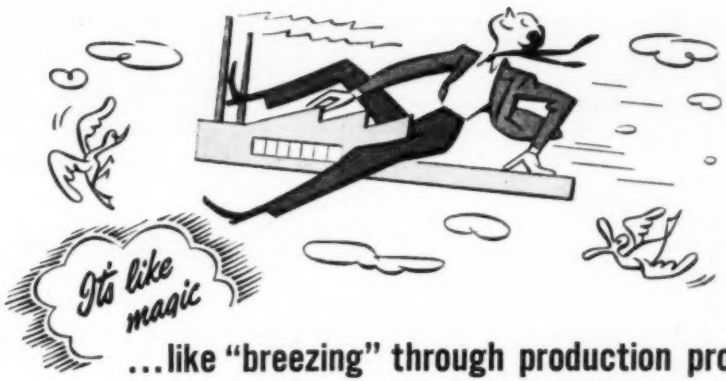


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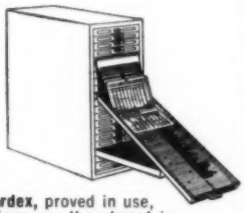

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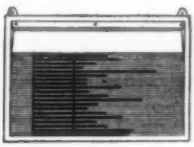

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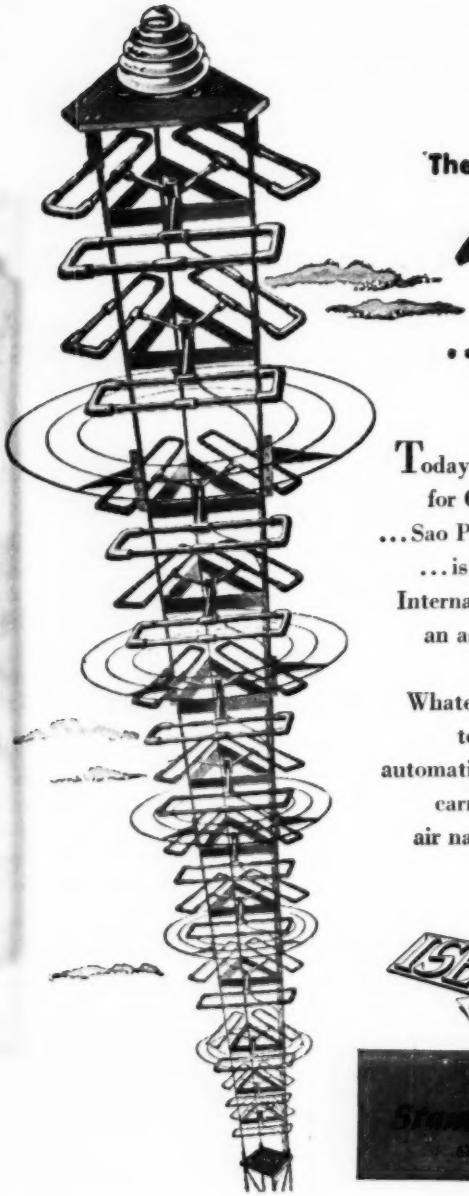

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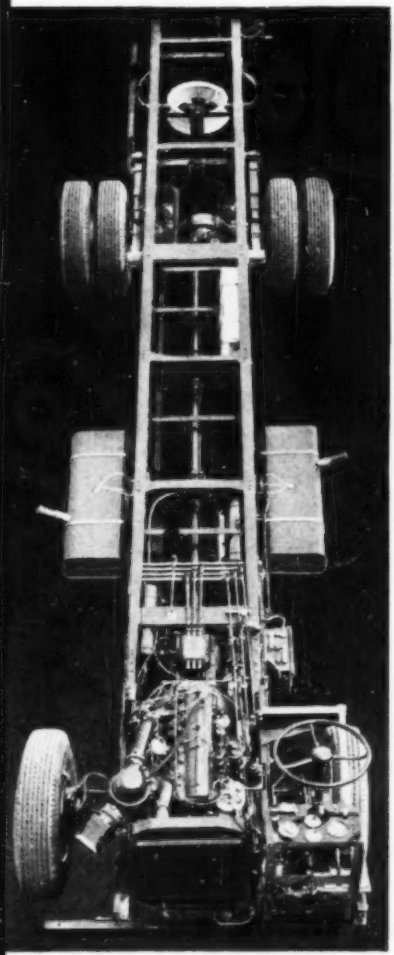

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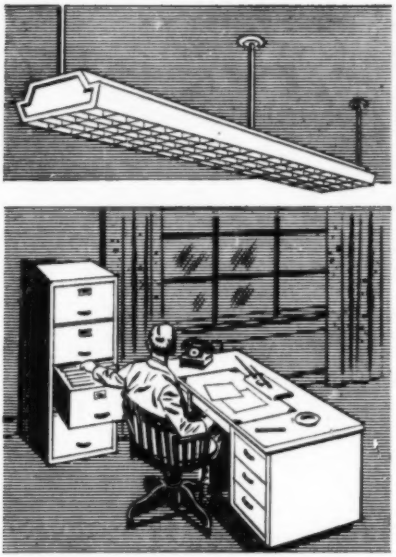

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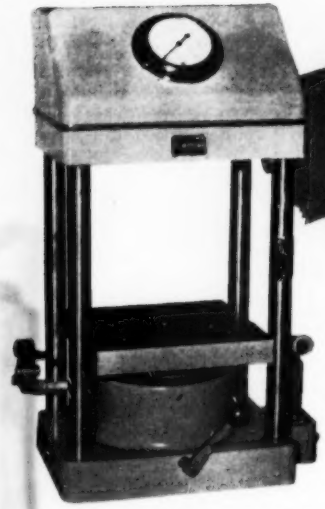

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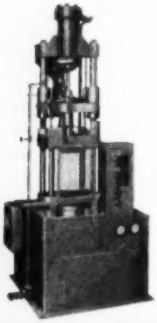

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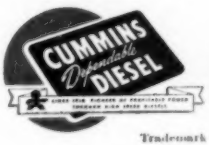


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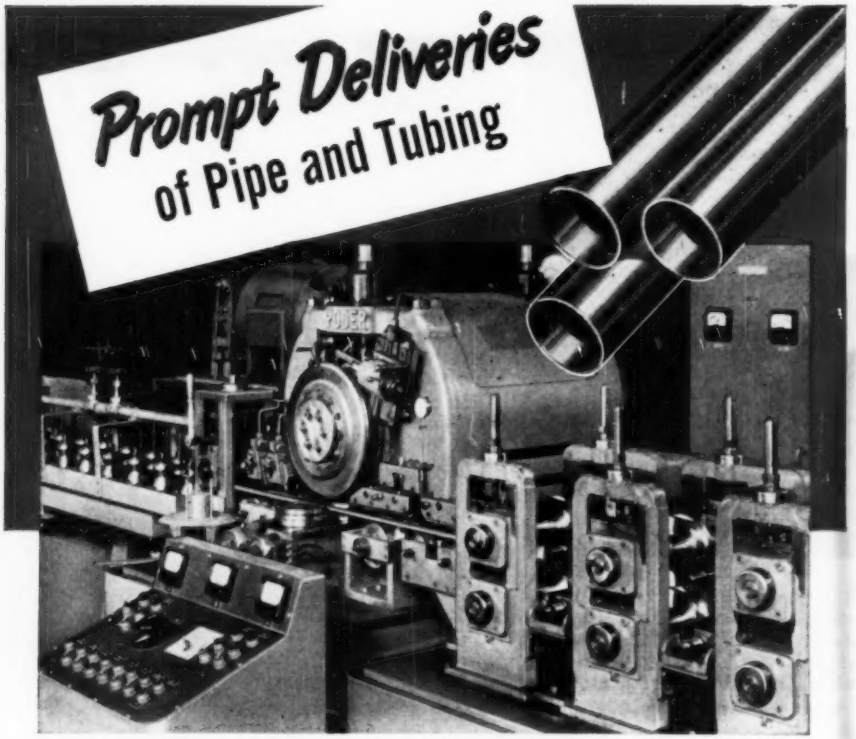

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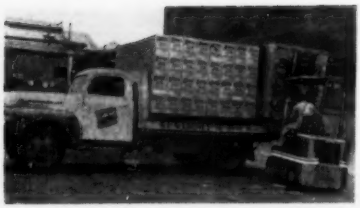

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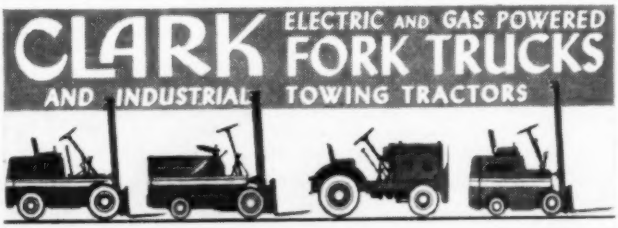


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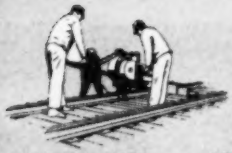

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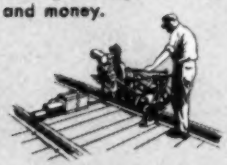

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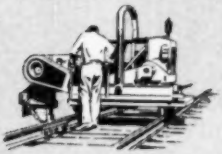

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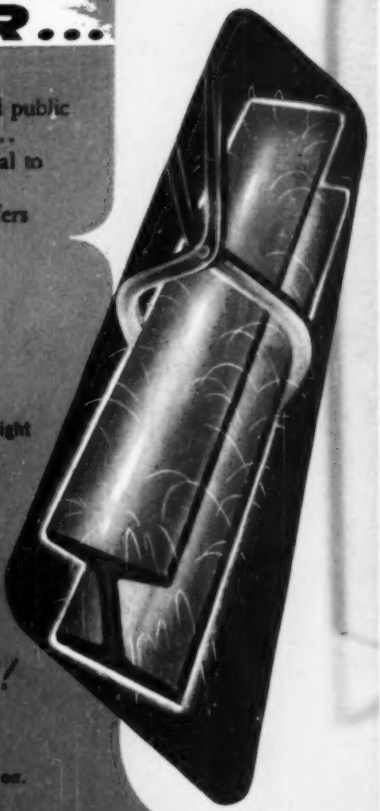

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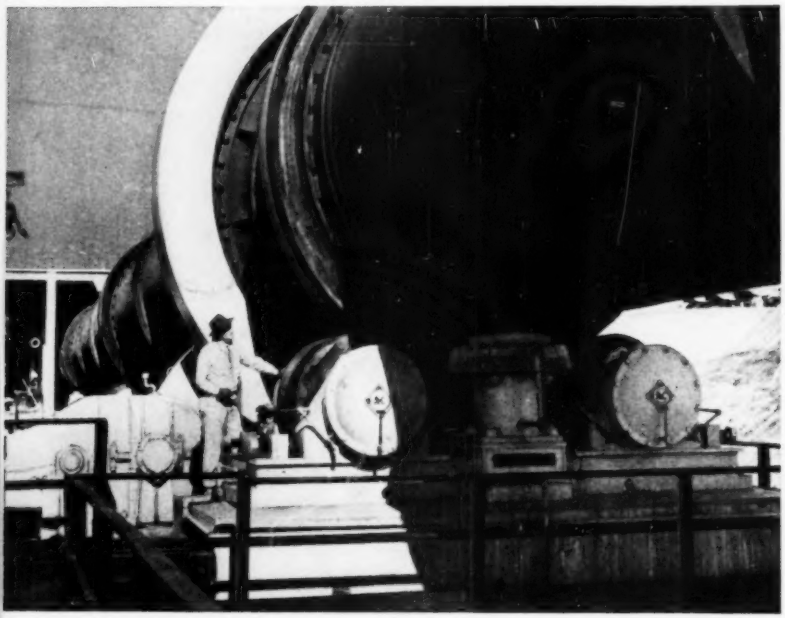

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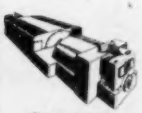

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